GOITER PREVENTION AND THYROID PROTECTION

ISRAEL BRAM, M.D.

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Goiter Prevention
AND
Thyroid Protection

BY

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TO MY ESTEEMED FRIEND

THE FATHER OF RATIONAL ENDOCRINOLOGY

PROF. CHARLES E. DEM. SAJOUS, M.D., SC.D., LL.D.

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PREFACE

Progress in medicine is directly related to progress in human happiness. Probably the greatest advances in medicine within the past decade have been in the field of the ductless or endocrine glands. Formerly regarded as mysterious structures possessed of little if any function, it is now known that these organs not only control physical and mental development and health, but the very destiny of mankind.

Most important of our ductless glands,—those little organs which play such big rôles in life's processes, —is the thyroid. This small, U-shaped structure, situated beneath the superficial tissues in front of the neck and weighing approximately one ounce, is more susceptible to disorder than any other part of the body. Whether it is swollen into goiter formation or not, whether it is deficient or excessive in secretion, whether this secretion is of abnormal nature, any departure from its proper structural and functional balance gives rise to more embarrassment, more physical and mental ailments, and consequently greater disturbance of happiness, than any other factor in the practice of medicine. Indeed, there is scarcely a medical journal, hardly a month's transactions in a medical society, in which a discussion on the thyroid gland is not a major consideration. Hundreds of articles appearing in popular magazines and

in newspapers during the past decade attest the timely awakening of the world to the need for dependable knowledge on this vital topic.

Were an examination made of the residents of a city like New York, with attention concentrated upon each person's neck, the observer would be astounded to find that approximately every twentieth person presents a mild, moderate, or large goiter. At this ratio there are about six million persons suffering with goiter in this country alone. But this is not the *whole* truth. In regions known as goiter belts, such as about the Great Lakes, along the St. Lawrence River, and in our Northwestern States, the percentage of goitrous individuals is far greater and would probably raise the total number of sufferers to more than seven million! In Europe this problem is even more acute. For example, in the Canton of Berne, Switzerland, 75 per cent. of the six year old children just entering school suffer with goiter, and by the time they reach the sixteenth year, goiter incidence is increased to 94 per cent.[1]

Moreover, Graves's disease, that tragic malady commonly called exophthalmic goiter but which, strictly speaking, is not goiter but a constitutional condition, is increasingly taking its toll in untold suffering throughout the civilized world. The high tension mode of existence during the past decade or two, with the multiplicity of automobiles, aircraft, highwaymen, "jazz" music, "jazz" thinking and acting, the morbid craving to be entertained, the char-

[1] C. Wegelin: International Clinics (Phila.), 1926 (Series 36), p. 38–46.

acter of movie and stage presentations, marital incompatibilities and divorces, all these and many more current factors serve to undermine the stability of the nervous and ductless gland structures of susceptible individuals to the extent of increasing markedly the incidence of this disease. In a word, the World War with its consequent international and social unrest and vacillating standards of thinking and acting is responsible for the extreme tension under which we live and the great increase of so-called exophthalmic goiter cases in our midst.

The sociological aspect of this problem is by no means to be ignored. Invalidism, mental inefficiency and aberration deprive society of a goodly percentage of members who would otherwise be assets. Physical and mental backwardness in school children, certain types of insanity, and numerous instances of potential and actual criminal trends can be traced to thyroid disturbances. Not only the physician, but the psychologist, the school teacher, the sociologist and the criminologist are today looking to the thyroid and other ductless glands as considerations in the solution of their problems.

In my many years of exclusive work in this field, I feel that the thyroid gland is more sinned against than sinning. There need be little disturbance of this vital organ if certain simple rules of physical and mental conduct were observed. Such information as would help to prevent potential and overcome actual structural and functional disorders of the thyroid gland is offered in the forthcoming pages. Since in past years I have written solely for the medical pro-

fession, it is my intention that this volume be useful and interesting to the non-medical as well as the medical individual. In the presence of an actual thyroid disturbance both doctor and patient will here find helpful suggestions calculated to create the co-operative spirit so vital to prompt recovery.

To Dr. Charles E. de M. Sajous, Professor of Endocrinology, University of Pennsylvania Graduate School of Medicine, I am deeply indebted for the inspiration of his friendship and his epoch-making works.

To my friend, Dr. Robert Olesen, of Cincinnati, Surgeon in the United States Public Health Service, an outstanding authority on endemic goiter in this country, I wish to express my gratitude for his chapter on Endemic Goiter in the United States.

To Dr. Robert McCarrison, Director of Deficiency Disease Inquiry, in the service of the British Government, Pasteur Institute, Coonoor, India, I am grateful for his views on the relationship of iodine to goiter, contained in Chapter X as a personal communication.

To my wife who has ever assisted me in my scientific writings in an untiring, devoted spirit, I am greatly indebted for her many helpful suggestions in the preparation of the manuscript.

Israel Bram.

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Philadelphia.

CONTENTS

PART I.

PAGE

CHAPTER I. WHAT IS THE THYROID GLAND? 17

Size, Shape and Location of the Thyroid Gland, 18; The Thyroid Under the Microscope, 19; Functions of the Thyroid, 20; The Thyroid Secretion or Hormone, 21; The Thyroid as a "Catalyst," 22; What is Basal Metabolism? 23; The Thyroid as a Heat Regulator, 25; The Thyroid as a Regulator of Function of Other Ductless Glands, 25; The Thyroid and the Circulation, 27; The Thyroid as the Disease Fighter, 28; The Thyroid and the Mind, 29.

CHAPTER II. THE THYROID IN HEALTH 30

The Thyroid in Life's Epochs, 31; Punishing the Thyroid Gland, 33; How to Protect Your Thyroid, 34; The Thyroid Our Physical and Mental Barometer, 36.

CHAPTER III. THE THYROID IN DISEASE 37

Disturbed Thyroid Function May Occur With or Without Goiter, 37; Infantile Hypothyroidism or Thyroid Deficiency (Cretinism), 39; The Eugenic Phase of the Question, 42; Deficient Thyroid Secretion in Adults (Hypothyroidism or Myxedema), 43; Conserve Your Thyroid, 46; Excessive Thyroid Secretion (Hyperthyroidism), 47; Combinations of Hypo- and Hyperthyroidism, 49; The Thyroid is the Fireman of Life's Processes, 50.

CHAPTER IV. WHAT IS A GOITER? 51

Indefinite or Borderline Goiters, 51; Measurement of the Neck, 52; The Element of Personal Equation, 54; Imaginary *versus* Real Goiter, 54; What is Not Goiter, 56.

CHAPTER V. VARIETIES OF GOITER 57

Goiters which are Tumor Masses (Surgical Goiter), 58; Goiters Which are Not Tumor Masses (Non-surgical Goiter), 60; Goiter Types According to Geographical Location, 61; Miscellaneous Goiter Types, 62; Intrathoracic Goiter, 65; Aberrant or Accessory Goiter, 68; Iodine and Thyroid Extract Hyperthyroidism, 68.

PAGE

Chapter VI. Causes of Simple Sporadic Goiter 69

Goiter Exists in Almost All Animal Life, 69; Epidemics of Goiter, 70; Infections in Goiter Causation, 70; Diseased Tonsils and Goiter, 71; Goiter is Not Contagious, 71; Hereditary Influences, 72; Personal Susceptibility to Goiter, 72; Influence of Sex on Goiter Incidence, 73; Influence of Race on Goiter, 74; Undernutrition and Goiter Formation, 74; Sudden Onset of Goiter, 75; Usual Course of Goiter Development, 76; Summary, 78.

Chapter VII. Goiter Belts and Endemic Goiter 79

Goiter Present Everywhere, 79; Goiter a National Problem, 81; Geographical Influence on Types of Goiter, 82; Endemic Goiter in the United States, 83.

Chapter VIII. Endemic Goiter in the United States 85

Introduction, 85; Cause of Endemic Goiter, 86; Distribution, 88; Independent Thyroid Surveys, 91; Special Considerations, 92; Prophylactic Methods, 97; Conclusions, 107; Bibliography, 107.

Chapter IX. Prevention of Goiter 110

Prevention of Endemic Simple Goiter, 110; Prevention of Cretinism, 111; Prevention of Sporadic Simple Goiter, 112; Prevention of Simple Thyroid Tumors, 114; Prevention of Malignant Goiter. 115.

Chapter X. Iodine *versus* Goiter: Facts and Fallacies 116

Contradictory Views on Causation, 116; View of the Majority, 118; Iodine in the Thyroid Gland, 119; McCarrison's Views, 120; The Danger of Overenthusiasm, 123; How Iodine Harms in Goiter, 126; Symptoms of Iodine Poisoning, 127; Iodine in Exophthalmic Goiter, 128; Summary, 129.

Chapter XI. Treatment of Goiter 131

Beware of the Quack, 131; Look Out for Faddism, Too, 133; Goiters Requiring Operation, 135; Goiters Which Must Not Be Operated Upon, 136; Differences Between Surgical and Non-surgical Goiter, 137; Treatment of Non-tumorous (Non-surgical) Goiters, 139; Elimination of Discoverable Cause, 139; The Diet, 140; Hygienic Treatment, 141; Medical Treatment, 142.

PART II.

PAGE

CHAPTER XII. DESCRIPTION OF EXOPHTHALMIC GOITER 147

Definition, 147; Exophthalmic Goiter is Not Hyperthyroidism, 147; Involvement of Other Ductless Glands, 148; The Involuntary Nervous System, 149; Types of Exophthalmic Goiter, 150; Early Exophthalmic Goiter, 151; The Average Case of Exophthalmic Goiter, 151; The Mind, 153; The Expression or Physiognomy, 154; Trembling, 155; Heart Symptoms, 155; The Goiter, 155; Protrusion of the Eyeballs (Exophthalmos), 156; The Weight, 157; Fatigue and Weakness, 158; The Digestive Tract, 159; The Skin, 160; The Voice, 161; The Lungs, 161; Bladder Irritability, 162; Menstrual Disturbances and Sterility, 162; Sleep, 162; The Temperature, 163; The Basal Metabolism, 163; A Paradoxical Combination, 164.

CHAPTER XIII. THE CAUSE OF EXOPHTHALMIC GOITER 165

Exophthalmic Goiter is Not Goiter, 165; It is a Constitutional Disease, 166; Hereditary Influences, 166; The Age Factor, 167; The Sex Factor, 167; The Race Factor, 168; Exophthalmic Goiter and Civilization, 168; Infections and Exophthalmic Goiter, 170; Diseased Tonsils, Teeth and the Like, 170; Iodine and Thyroid Extract Drugging, 171; The Most Usual Cause, 171; Worry the Greatest Instigator, 172; Summary, 174.

CHAPTER XIV. PREVENTION OF EXOPHTHALMIC GOITER 175

Difference Between Susceptibility to Goiter and Susceptibility to Exophthalmic Goiter, 175; The Need for Preventive Efforts, 176; Candidates for Exophthalmic Goiter Constitute a Type of Humanity, 177; Increasing the Individual's Resistance, 178; The Avoidance of Exciting Causes, 181; Summary on Prevention of Exophthalmic Goiter, 182.

CHAPTER XV. TREATMENT OF EXOPHTHALMIC GOITER 183

Operation of Doubtful Value, 183; The Thyroid Swelling is Welcome, 183; Surgeons, Too, are Fair and Conscientious, 184; A Controversy Being Settled, 185; Patience is a Virtue, 186; Quantity *versus* Quality, 186; Views of Other Observers, 187; The Solution of the Problem, 189; Medical Treatment, 189; Early Treatment Means Early Recovery, 190; Cooperation is Vital, 190; Work During Treatment, 191; Placing the Patient, 191; The Rest Program, 193; Sleep and Relaxation, 194; Exercise, 194; Water Treatment, 195; The Diet, 196; Smoking and Other Habits, 197; Medicines, 198; The Question of Diseased Tonsils, Teeth, Etc., 199; Mental Adjustment or Psychotherapy, 199; Choose the Patient's Callers, 200; Recreation an Asset, 201; Duration of Treatment, 202; The Reward of Patience, 204; The Dawn of Good Health, 205; What Happens to the Lump on the Neck? 206; What Constitutes Recovery? 207; Conclusiveness of Recovery, 207.

PART III.

PAGE

CHAPTER XVI. EATING AND THE THYROID 213

The Flesh Food Question, 213; The Vegetarian Diet, 215; An Ideal Dietary, 215; Destructive "Appetizers," 216; "Soft" Drinks are Hard on Health, 216; Foods Permitted in a Sensible Dietary, 217; Comments on Permissible Foods, 218; What to Avoid, 219; When to Eat, 220; How to Eat, 221; Eat Calmly and Smile, 222; How Much to Eat, 222; If You Must Reduce Weight, 223; If You Must Gain Weight, 226; Diet for Increasing Weight, 230; The Diet in Exophthalmic Goiter, 231; Bread an Asset in Gaining Weight, 232; Weight an Index to Progress, 233.

CHAPTER XVII. SLEEP AND THE THYROID 235

Effect of Sleep on the Thyroid Gland, 235; Effect of the Thyroid Gland on Sleep, 235; How Much Should We Sleep? 236; Sleeplessness, 238.

CHAPTER XVIII. THINKING AND THE THYROID 241

Reasoning *versus* Excitement, 241; The A B C of Mental Health, 241; Keeping Cool, 242; The Thralldom of Worry and Fear, 243; Never Say "I'll Try," 245; Worry and Work, 246; All Work and No Play, 247; Precarious and Vicarious Play, 248; Play and the Home, 249; The Most Relaxing Recreating Forces, 250.

APPENDIX: A BRIEF DESCRIPTION OF OUR DUCTLESS GLANDS 253

What Is a Ductless Gland? 253; The Beginning of Endocrinology, 254; The Source of Personality, 255; How the Ductless Glands Function, 256; The Most Important Ductless Glands, 257; The Thyroid Gland, 257; The Parathyroid Glands, 258; The Pituitary Gland, 259; The Adrenal Glands, 267; The Thymus Gland, 271; The Pineal Gland, 272; The Sex Glands (Gonads), 273; Sexual Epochs, 273; Double or Doubtful Sex (Hermaphroditism), 275; Eunuchism, 276; Eunuchoidism, 279; Rejuvenation, 279; The Internal Secretion of the Pancreas, 281; The Ductless Glands and Growth, 282; The Ductless Glands and Mentality, 284; The Ductless Glands and Strength, 289; The Ductless Glands and Age, 291; Miracles of Endocrinology, 292.

INDEX 303

ILLUSTRATIONS

FIG. PAGE

1. (1) Borderline goiter and (2) appearance of goiter, in reality a layer of fat 52
2. Large tumor goiters 59
3. Non-tumorous goiters 60
4. Goiters in men 63
5. Goiters extending behind the breast bone into the chest cavity.. 67
6. Diagrammatic representations of normal gland, tumorous goiter and non-tumorous goiter (Colored) 136
7. Recovery from colloid goiter without operation 143
8. Recovery from hypertrophic goiter without operation 143
9. Examples of typical exophthalmic goiter or Graves's disease ... 152
10. Recovery from exophthalmic goiter without operation 209
11. Recovery from exophthalmic goiter without operation 209
12. The first, a case of myxedematous obesity. The second, the same 8 weeks after treatment 225
13. Apparent goiter from undernutrition, result of treatment 227

PART I

CHAPTER I.

WHAT IS THE THYROID GLAND?

Some years ago Sir William Osler remarked that a man is as old as his arteries. Since then the science of endocrinology has come to the fore and more information concerning life's processes is in our possession, so that we may modify Osler's dictum and state that a man is as old as his thyroid. Directly and indirectly, the thyroid gland is concerned not only with the circulatory tree, the condition of the arteries included, but with combustion or metabolism without which there is no life. A normally acting thyroid is synonymous with good physiological balance. A shrunken thyroid characterizes senility with its hard arteries; a healthy thyroid accompanies the bloom of youth with its associated soft, yielding arteries.

All our thoughts and actions are the result of intercellular chemical exchange,—a veritable give and take of known and unknown secretions and excretions. The ductless glands[1] are the regulators of this exchange of chemicals with the thyroid gland at the helm. A normal thyroid gland is a good index of normality of the remaining ductless glands and of physical and mental well-being.

[1] A brief description of our ductless or endocrine glands is contained in the Appendix of this work.

SIZE, SHAPE AND LOCATION OF THE THYROID GLAND.

The thyroid is a ductless gland because its secretion is not expelled through ducts or minute tubes as is the case with the salivary and other glands, but is taken up by the blood stream directly and utilized in the interests of physical and mental physiological balance. It is shaped like the letter U, and consists of two lobes with a rotund connecting isthmus. Depending upon the age, sex, race and stature of the individual, the gland weighs anywhere between a quarter of an ounce and two ounces. The weight also varies with such conditions as menstruation, pregnancy, such focal infections as occur in tonsils, teeth and elsewhere, such diseases as rheumatism, typhoid fever and pneumonia, and whether the individual resides in a part of the world designated as a goiter belt. Intense and prolonged exertion, whether physical or mental, may likewise effect an increase in the size of the thyroid. Its maximum growth is reached with the onset of complete sexual development of the individual. Between the ages of 35 and 50 its largest growth is maintained. After 50 a degree of shrinking is observed. Generally speaking, the thyroid is larger in women than in men.

The thyroid rests upon the cartilages of the larynx, the broad end of each side lobe terminating about three-quarters of an inch above the upper limit of the breast bone. The isthmus merges on each side with the lower end of the lateral lobes to complete the capital U, crossing the neck horizontally at a point corresponding to the second, third and fourth

rings of the trachea. The thyroid is firmly ensheathed with a layer of strong membrane (fascia) which likewise connects it to the trachea. This explains the up and down movement of the organ with the act of swallowing. The gland is intimately related in location with such very important structures of the neck as the esophagus, the carotid arteries, jugular veins, the tenth cranial nerves, the parathyroid glands, and other important structures which, if compressed or injured, may lead to serious trouble. In about 40 per cent. of individuals there springs from the isthmus an upward extension known as the pyramidal lobe which reaches upward to one-half the height of the lateral lobes.

These remarks on the anatomy of the thyroid gland pertain to the average person. But even anatomy has its exceptions, and we often find not only a change in shape, size and position as a peculiarity of the individual, but likewise a difference in blood-supply. Rarely, as a substitute for or a supplement of the normal thyroid, one is apt to possess so-called accessory thyroid structures in the neighborhood of the tongue, pharynx, esophagus, trachea, aorta, and even the ovarian regions.

THE THYROID UNDER THE MICROSCOPE.

The microscopic structure of the thyroid is more interesting to the laboratory savant than to the lay reader. Briefly, were we to examine a tiny tissue-paper-like section of a normal thyroid under the microscope, we would find the following picture: A

series of irregularly shaped chambers of approximately 50 to 300 micromillimeters[1] in size, each lined with cuboidal secreting cells. These chambers, called acini or vesicles, are separated by a network of connective tissue containing the blood-vessels going to and from the thyroid gland. Terminal capillaries and lymphatics are located immediately about the vesicles. The vesicles contain a thick gelatinous substance called colloid, which contains the active principles or hormone of the gland. The thyroid gland is well supplied with blood, receiving about twenty-eight times as much of this vital fluid as does the head, and it is about five times as vascular as the kidneys. Further discussion of the blood supply, including the lymphatics and nerve supply, is not feasible in this work. If a detailed description is desired the reader might consult a text-book on human anatomy.

FUNCTIONS OF THE THYROID.

Though there is still very much to be learned concerning the functions of the thyroid gland, we now have very interesting and useful information concerning its purposes. Formerly regarded by some as an organ to beautify the neck and make it "swan-like," by others as a structure regulating the blood supply to the head, and by still others as a portion of our anatomy which is supposed to lubricate the vocal cords, we know today that none of these opinions is true, and that the thyroid is one of our vital organs.

[1] A micromillimeter is one-millionth part of 39.37 inches.

Life is *possible* for a while without a thyroid gland, but this is merely a vegetative existence. It has been said that the thyroid gland is what makes life worth living. The truth of this statement is emphasized when it is observed that an individual possessing little or no thyroid gland is worthless to self and society. It is the thyroid gland, through the secretion or hormone which it sends into the blood, that directly and indirectly regulates normality of structure and function of every tissue in the body.

THE THYROID SECRETION OR HORMONE.

The secretion of the thyroid is a kind of juice the exact nature of which is as yet unknown. It was Baumann[1] who, in 1896, discovered iodine in the thyroid gland in the form of iodothyrin. According to Reed Hunt[2] the dried human thyroid gland contains from 0.23 to 0.26 per cent. of iodine. When the percentage falls below 0.1 per cent. goiter is apt to develop. In 1914 Kendall[3] was able to extract what he termed the active principle of the thyroid, a substance named thyroxin. This is a highly potent poison but in minute doses is capable of maintaining a thyroidless animal or human being in relative good health. The thyroid secretion, whether it be thyroxin or the more crude or gross product from this organ, must contain iodine in order to be potent. Iodine is constantly present in the normal thyroid gland. This statement must not tempt the reader to

[1] Baumann: Ztschr. f. physiol. Chem., 1896–1897, *21*, 19.
[2] Reed Hunt: Jour. Amer. Med. Assoc., 1907, *49*, 1324.
[3] E. C. Kendall: Jour. Biol. Chem., 1914, *19*, 251.

conclude that any *abnormality* of the thyroid requires the taking of iodine for its correction. This will be discussed later. It frequently happens that the smaller the thyroid gland the greater the iodine content. For instance, in the Japanese the weight of the thyroid is about one third that of the European, but the iodine content is greater. The iodine percentage is greater in the female than in the male and lower in the extremes of age than in middle life. The iodine content likewise varies with geographical conditions, the diet, adolescence, menstruation, pregnancy, lactation, menopause, infections, and even extreme physical and mental excitation.

THE THYROID AS A "CATALYST."[1]

The thyroid gland, through its secretion, is directly concerned with the upbuilding and tearing down of bodily tissues, a process known as metabolism. All living structures undergo an upbuilding (anabolic) and a tearing down (catabolic) process. During growth the upbuilding process is in the ascendency until adult life is reached, when both the upbuilding and tearing down processes are at an equilibrium, and the normal weight and functions of the body structures are maintained. Deficiency of thyroid secretion results in impeded elimination through retardation of the breaking down process of the body. As a result certain symptoms known collectively as hypothyroidism assert themselves. If this occurs in

[1] A catalyst is a substance capable of promoting the chemical reaction incident to oxidation of living tissue.

the infant, development is impeded and perpetual infancy (cretinism) results. If it occurs in an adult, the mentality becomes dull and sensibilities are obtunded. There is a constant desire to sleep, the skin is dry, thick, waxy and somewhat scaly, there is an increase in weight, a reduction in pulse rate and temperature, and a retardation in intestinal, kidney and other elimination. If this occurs spontaneously, the condition is called myxedema; if the symptoms result from surgical removal of the thyroid gland, cachexia strumipriva is the term applied.

On the other hand, if the thyroid gland secretes too much, resulting in the symptoms of hyperthyroidism, the manifestations are totally opposite to those presented by too little thyroid secretion. Growth is often augmented; the mentality is overly acute; the sensibilities are sharpened; there is sleeplessness; the skin is soft, thin, moist and flushed; progressive loss in weight occurs; tremor of the outstretched fingers and toes is characteristic; the heart rate may be increased to 100 or more, even as high as 200 per minute; diarrhea and oversecretion of the kidneys is quite usual; though the appetite may be good, there is a steady loss of weight and strength. The bodily temperature may be increased from one to three or more degrees.

WHAT IS BASAL METABOLISM?

The term *basal metabolism* now deserves our attention. As implied above, *metabolism* is the cellular exchange characterizing life's processes, consisting of two sub-processes: *anabolism* the upbuilding pro-

cess and *catabolism* the breaking down or energy producing process. By the *basal metabolism* of an individual is meant the minimal heat produced by the body measured after at least a 14 hours' starvation period with the person at rest. The *basal metabolic rate* expressed technically as the B. M. R. is thus deduced. The figure is secured by the aid of an instrument called a calorimeter, with proper computation of age, sex, height, weight, temperature and barometrical conditions of atmosphere and apparatus, square inches of body surface of the subject, and the number of cubic centimeters of oxygen consumed per minute during a period of several minutes. The resulting figure representing the B. M. R. of a normal individual should vary between minus 12 and plus 12. Since the thyroid gland is the major factor in metabolism, its disease would mean an alteration of this figure. Thus in deficiency of thyroid function, the B. M. R. would vary between minus 12 and minus 40; in increased activity of this organ the rate rises to plus 40, 60, or even plus 100 or more, depending upon the gravity of the condition. The determination of the basal metabolic rate in illnesses difficult of diagnosis is very valuable, for when this is done and thyroid disease discovered, prompt, accurate treatment saves the patient very much in terms of invalidism and expense. It must be added that thyroid disease is not the only cause of an altered B. M. R., but is the *main* cause, being responsible for at least 95 per cent. of variations from the normal figure. The remaining 5 per cent. occur in the presence of other diseases, as for example, those of the pituitary and

other ductless glands, diabetes mellitus, chronic heart disease, chronic kidney disease, the severe forms of anemia, carcinoma, and the infectious fevers. During pregnancy the B. M. R. may be plus 25 or more. In conditions other than those of the thyroid the alteration in the B. M. R. is relatively slight.

THE THYROID AS A HEAT REGULATOR.

The catalytic or metabolic function is directly related to the heat regulating mechanism. The thyroid gland, therefore, plays an important rôle in regulating the temperature of the body.[1] In view of this fact careful physicians usually include an examination of the thyroid when called to attend a fever patient. The sufferer from hyperthyroidism and from exophthalmic goiter presents an unduly warm skin and complains of feeling hot, even in cold weather. Patients with hypothyroidism are chilly, and the skin is cool and dry.

THE THYROID AS A REGULATOR OF FUNCTION OF OTHER DUCTLESS GLANDS.

The thyroid gland is also a factor in the maintenance of a functional balance between all the ductless glands and also other glands in the body. In other words, the thyroid assists in the establishment of interglandular equilibrium. We might state briefly that deficient function of the thyroid increases and excessive function diminishes parathyroid function;

[1] It must be remembered that the regulation of the temperature of the body is governed by a *complex* mechanism in which factors other than the thyroid play an important part

that the suprarenal glands are markedly influenced by the thyroid, which in turn is influenced by improper function of these glands. The thymus gland is found to be considerably enlarged in a majority of patients suffering with increased thyroid function. The pituitary gland is in a variable state of aberrant function during the existence of excessive thyroid secretion. The pancreas is in a state of functional fatigue during hyperthyroidism, often to the extent of giving rise to a considerable percentage of sugar in the urine. Indeed, in marked instances this may lead to frankly outspoken symptoms of diabetes mellitus. On the other hand, in the presence of deficient thyroid function the individual can take undue quantities of sugar and starches without any apparent harm. The sex glands are influenced by thyroid function so that patients suffering with diminished thyroid secretion are often sterile. The same might be said of individuals with excessive thyroid secretion, in addition to which there are irregularities in menstruation, especially prolonged absence of menstruation for months and even years. The spleen is often somewhat enlarged in the presence of excessive thyroid secretion. The kidney secretion is deficient in patients with lessened thyroid secretion and greatly increased in those with hyperthyroidism. In deficiency of thyroid secretion, constipation is the rule; when the thyroid secretes excessively there may occur nausea and vomiting, and diarrhea may be so stubborn and unmanageable as to endanger the life of the individual.

THE THYROID AND THE CIRCULATION.

The thyroid markedly influences the circulatory system. This it does either alone or by its interrelationship with the pituitary and suprarenal glands. Deficient thyroid secretion retards and excessive secretion quickens the heart's action and pulse. In hypothyroidism the pulse rate may be found as low as 50 or 40 per minute, while in hyperthyroidism and in exophthalmic goiter the rate may reach 160 or more and even exceed our ability to count. The blood-pressure in lessened thyroid secretion is apt to be high, while in instances of increased thyroid secretion the blood-pressure may be low or high depending upon circumstances, especially the seriousness of the illness and the type of goiter existing. The influence of thyroid secretion upon surface circulation is interesting. The pale waxy color of a patient with hypothyroidism is indicative of poor skin circulation and of an accumulation of a mucinous substance beneath the skin, while the moist rosy-hued skin of an individual with hyperthyroidism and exophthalmic goiter denotes an abnormally high circulation at the surface of the body. The blood itself is influenced in many ways. In hyperthyroidism and in exophthalmic goiter the removal of tonsils or some other minor operation is fraught with danger because of the possibility of excessive hemorrhage. These persons are bleeders, the blood containing less calcium, hence requiring more time to coagulate than in a normal individual.

THE THYROID AS A DISEASE FIGHTER.

One of the important functions of thyroid secretion is to protect and immunize the individual against the inroads of disease. Sufferers from lessened thyroid secretion are exceedingly prone to infections and may be carried away by a disease which a normal person can easily combat. Many eminent consulting physicians now prescribe judicious doses of thyroid extract in the treatment of diseases of an infectious nature. The knowledge that the thyroid is a poison-fighting organ is a strong argument in favor of conservatism in thyroid operations, especially in the absence of a tumor of this organ. The enlargement of the thyroid gland in exophthalmic goiter, for instance, is a defensive mechanism to fight off poison originating elsewhere in the body. When all other evidences of the disease have cleared up through expertly applied treatment and the thyroid is relieved of the duty of excessive poison-fighting, it shrinks slowly but surely to normal, much as a loaded sponge unloads itself of its contents.

THE THYROID AND THE MIND.

Even the mind is largely influenced by the functional phases of the thyroid gland. A keen observer[1] has well said that "the thyroid is not essential to life, but it is synonymous with making life worth living." We differ somewhat with the first part of this statement in that the thyroid, being a vital organ, *is* essential to life. That it is synonymous with making

[1] George W. Crile: Abst. Jour. Amer. Med. Assoc., 1919, *73*, 1633.

life worth living is unquestioned when we see that without adequate thyroid secretion an individual is practically worthless to self and society, merely existing but not living. In my larger book on goiter[1] I state that "contrary to the opinion of a few enthusiasts of thyroid surgery, a normally active individual requires all the thyroid given him by Nature so that he may successfully cope with the problems of the day and compete physically and mentally with his fellowmen. The opinion that the growing child needs but one-third of its thyroid and that the adult may maintain perfect health with but one-sixth of the gland given him by Nature is erroneous and leads to harmful therapeutic implications. The demands made upon the thyroid gland in the growing adult, during menstruation, pregnancy, and in the infections, and the gradual atrophy which the gland undergoes during old age, are indications of the vital importance of the entire organ throughout life. In middle age especially is the thyroid gland apt to be deficient in function, often requiring thyroid opotherapy[2] to offset premature senility."

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[1] Israel Bram: Goiter, Non-surgical Types and Treatment; The Macmillan Co., New York.

[2] Opotherapy is the term applied to the prescribing of glandular substances.

CHAPTER II.

THE THYROID IN HEALTH.

The normal thyroid gland in individuals residing in localities away from goiter belts should be quite invisible. Unless the person is undernourished, the skin and normal layer of fat covers the organ in such manner as to give the neck a straight or slightly concave profile. The experienced examining fingers can, however, detect the shape and size of the normal thyroid gland if there is not too much of a pad of fat over it, as, for instance, in obese individuals. On the other hand, even the normal thyroid may be quite visible in those who are undernourished, the organ standing out in bold relief beneath a deficient covering of skin and fat.

Again, the presence of a normal thyroid gland, insofar as shape and size are concerned, is no criterion regarding normality of *function*. The thyroid need not be enlarged to be troublesome. Some of the most serious cases of hyperthyroidism and of exophthalmic goiter present no enlargement of the gland on examination. As a rule, however, symptoms of thyroid disease, especially hyperthyroidism are usually associated with an alteration in the size of the gland. This may vary from a slight swelling to a mass large enough to produce symptoms of pressure. Evidences of thyroid underactivity (hypothyroidism) may likewise show goiter formation, but

usually the gland is smaller than normal and may be so shrunken as to be scarcely discoverable even to the experienced fingers.

THE THYROID IN LIFE'S EPOCHS.

During the first few weeks of infancy the gland does not play an important rôle in the body if the mother nurses the baby. The mother's milk contains her thyroid secretion and is of ample quantity and quality to supply the infant's needs. When weaning occurs, the infant's thyroid gland is of vital importance, for a deficiency of its secretion soon reveals itself in symptoms of cretinism.

During childhood, physical and mental evolution requires a healthy thyroid secretion. Backward children are very frequently those whose thyroid gland is inadequate for proper developmental processes. In the Alps regions, for instance, there are many instances of idiocy and deafmutism in children who have deficient thyroid secretion with or without goiter.

Puberty and adolescence appear to be the most important epochs in life insofar as the ductless glands are concerned. It is then that the primary and secondary sexual characteristics evolve and develop the individual into an adult. The thyroid gland plays a major part in this progress, and if inadequate in its function, retardation or even total arrest of development may result. During this time of life there is also the danger of goiter formation, especially in the female. Sexual development requires plenty of good, healthy thyroid action, and if this is not available,

the demands made upon the thyroid gland by organs elsewhere may whip it up into enlargement. Such a swelling is usually accompanied by a lowered basal metabolic rate, but occasionally the evidences of excessive stimulation of the thyroid gland with symptoms of hyperthyroidism are seen.

During adult life, extending to the fortieth or forty-fifth year, the thyroid gland is more or less constant in function in the male, unless such emergencies as infections, occupational strain, undue physical and mental exertion and the like, intervene. Of the adult female, however, it may truly be said that "the woman pays," since she is six or seven times more susceptible to functional and structural derangements of the thyroid than the male. The establishment of the menstrual epochs is very frequently concomitant with the occurrence of a thyroid swelling. Should she then escape definite goiter formation and marry, there is the danger of goiter during pregnancy. This does not mean that the danger cannot be overcome. Modern science is able to avert susceptibility to goiter during pregnancy if the individual presents herself to the physician early enough.

Again, during the menopause epoch, there is a change in the ductless glands in which the thyroid participates markedly. Goiter is apt to develop, but here, too, prevention is entirely possible. Ordinarily, however, the thyroid gland in persons past the age of forty-five begins slowly to shrink.

In old age the thyroid gland is more or less atrophied. According to Lorand[1] senility is due to de-

[1] A. Lorand: Old Age Deferred, F. A. Davis Co.

generation of the ductless glands, especially the thyroid, sex glands, the adrenals and the pituitary, the thyroid playing the major rôle. The resemblance between senility and myxedema with its increased weight, dry skin, sparsity of hair, slow pulse, dulness of senses, apathy, fatigue, constipation, and other features, has attracted the attention of keen observers, among the earliest of whom were Sir Victor Horsley, Ewald, Lorand and Gley.

PUNISHING THE THYROID GLAND.

The thyroid may be whipped up through undue demands made upon it by external or internal stimulants and irritants. We have already suggested that infections such as diseased tonsils and teeth, intestinal poisoning, such physiological conditions as adolescence, pregnancy, the menopause, undue physical and mental strain, unhygienic conditions, and many more circumstances require the thyroid to manufacture and send forth more than the usual quantity of its secretion.

When the thyroid is thus stimulated or irritated, it may withstand punishment for a while without resentment. Some persons appear immune to thyroid disturbance, despite continuous circumstances which would bring on extreme changes in others. In susceptible persons, however, a persistence of one or more conditions whipping the thyroid into excessive function may lead to one of four results: (*a*) habitual oversecretion which may become excessive enough to produce the symptoms generally known

as hyperthyroidism, with or without exophthalmic goiter; (*b*) depression of the thyroid function with evidences of hypothyroidism; (*c*) primary stimulation of the thyroid function to meet the demands made upon it, with secondary depression and hypothyroidism; (*d*) primary depression of thyroid function (hypothyroidism) with secondary stimulation (hyperthyroidism). These results may or may not be associated with the occurrence of goiter. Usually, however, when such irritation of the thyroid continues indefinitely, the organ enlarges into a goiter which at first is not tumor-like in nature and may be cured without operation. Later the mass may change in structure and become definitely tumorous, when it is too late for other than surgical treatment.

HOW TO PROTECT YOUR THYROID.

Degeneration or sluggishness of thyroid function results in poisoning of the body. The liver is incapable of destroying its poisons; the bowels are sluggish and retain their contents; the kidney functions are retarded. All this results in an accumulation of poisonous products in the blood and retardation of physical and mental functions. In addition, the individual is incapable of resisting the common infections. In the absence of a normally active protective thyroid gland, a cold, an attack of influenza or the like, becomes a menace to life itself.

Since overstimulation and irritation of the thyroid result in damage to its structure and function, it follows that conditions capable of punishing this

organ should be avoided in the interests of thyroid hygiene. I would recommend the following "fourteen points" in the protection of the thyroid:

1. See your dentist often enough to keep your teeth from becoming infected.

2. See that your tonsils, nasal passages, and sinuses are free from disease.

3. Make sure that your digestion and intestinal tract are in good working order.

4. Be careful to omit from your diet such substances as are included under condiments and spices; avoid much meat eating, alcoholic beverages, tea, coffee, ginger and caffein-containing beverages. (See Chapter on Eating and the Thyroid.)

5. If suffering with an attack of an acute general illness, such as influenza, remain patiently under your doctor's care until formally discharged.

6. Young girls should, if possible, stay in bed during the first day of each menstrual period, or should at least reduce their activities for a day or two at that time.

7. Pregnant women should consult their physician in order to prevent thyroid disturbance in self and offspring. Frequent pregnancies are most apt to produce goiter, since these amount to a frequent succession of undue demands upon the thyroid gland.

8. Sexual excesses should be avoided.

9. Never yield to the temptation of taking thyroid extract, iodine or other substances of like nature contained in advertised goiter and obesity "cures." Consult your physician when you believe you require medicine.

10. Secure plenty of sleep.

11. Avoid worry and emotionalism. Aim to smile externally and internally.

12. Moderate the amount of physical and mental stress and strain; never go beyond the point of fatigue. The tendency on the part of some ambitious individuals to work on "second wind" is decidedly harmful.

13. If you live in a locality known as a goiter belt see your physician with a view to proper goiter prevention.

14. Undergo a thorough physical examination by your physician twice a year.

THE THYROID OUR PHYSICAL AND MENTAL BAROMETER.

The thyroid exerts an influence over all the vital processes of animal life. Not a cell, not an organ, not a thought, but what is directly or indirectly influenced by an increase or a diminution of thyroid function. If we were endowed with a kind of supernatural vision, we should see the thyroid as a kind of barometer indicating every physical and mental stress and strain incident to life's progress.

In the next chapter we shall see what happens when the thyroid is primarily or secondarily in a state of disease.

CHAPTER III.

THE THYROID IN DISEASE.

When the thyroid gland is disturbed, complaints arise which, unfortunately, are apt to be misdiagnosed. The symptoms of disturbances of this organ are often so elusive that months may pass ere it is finally suspected of being at fault. During recent years we have been in possession of means which assist in precision in diagnosis of thyroid disorders, the most important of which is the basal metabolic test. When it is found that the metabolic rate is too low or too high, we are justified in concluding that, whatever else may be ailing the patient, the thyroid gland is probably at fault, secreting either too little or too much. Up-to-date physicians insist upon basal metabolic studies on all patients in whom the diagnosis of complaints is uncertain.

DISTURBED THYROID FUNCTION MAY OCCUR WITH OR WITHOUT GOITER.

As mentioned in the preceding chapter, the thyroid gland need not be enlarged during disturbed function. To be more specific, we might present the relationship between structural and functional thyroid disorders as follows:

1. An infant may be born without a thyroid gland and present evidences of cretinism.

2. An infant may be born with a goiter and present evidences of cretinism.

3. An adult may present symptoms of hypothyroidism in varying degree with a thyroid which is normal, smaller than normal, or goitrous, or show evidences of the surgical removal of the thyroid gland.

4. A child may show symptoms of deficient thyroid secretion and present a thyroid that is normal in size, smaller than normal, or goitrous.

5. The boy or girl during adolescence may present evidences of hypo- or of hyperthyroidism with a thyroid normal in size, smaller than normal, or goitrous. Usually, however, in the presence of too little or too much secretion in the adolescent, the thyroid gland is swollen in varying degree.

6. A goiter may be present and yet no symptoms may be complained of by the individual. In other words, aside from the goiter, the entire body appears to be perfectly normal. This is commonly observed in goitrous localities.

7. The above-mentioned goiter may remain harmless throughout life.

8. In about 25 per cent. of cases, however, this apparently harmless goiter may, during the tenth to the twentieth year of its existence, become toxic and the individual present evidences of hyperthyroidism.

9. The same goiter, simple or toxic, may continue to grow to an extraordinary extent and menace health and life through the production of pressure symptoms. This is especially true of goiters extending downward behind the breast bone into the chest cavity.

10. A goiter of this sort may, in addition, suddenly undergo cancerous changes. It must be understood, however, that cancer of the thyroid occurs in approximately one per cent. of patients suffering with the adenomatous[1] form of goiter, and selects the patient who has, as a rule, an inherited tendency toward cancer.

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[1] Partaking of the character of a non-malignant tumor.

11. It must also be remembered that the thyroid swelling of exophthalmic goiter never develops cancer.

12. In exophthalmic goiter, otherwise known as Graves's or Basedow's disease, goiter is usually, but not necessarily present. Nor is the bulging of the eyes (exophthalmos) necessarily present. Hence the term exophthalmic goiter is, strictly speaking, invalidated. It would be safer to call the disease by some other name so that errors in diagnosis and in treatment might be averted. The disease is of constitutional origin and will be described in detail in another chapter.

INFANTILE HYPOTHYROIDISM OR THYROID DEFICIENCY (CRETINISM).

Cretinism is a condition resulting from marked deficiency or absence of normal thyroid function, originating at birth. The condition is not commonly observed in this country. In the endemic goiter regions of Europe and Asia, however, cretinism is very common, and the cretin constitutes an important problem. There are varying degrees of severity of cretinism, the milder forms being frequently associated with mental backwardness, idiocy, deafmutism, and occasionally goiter.

The cretin is very frequently the offspring of a goitrous mother. Hence the prospective parent should be under the care of a competent physician with a view to the prevention of this condition in the baby. Prevention of cretinism in this manner is highly successful.

An infant born a cretin never grows to adult physical or mental life unless the condition is diagnosed in time and proper treatment is instituted. Untreated, the cretin is a perpetual infant though

it may reach the age of thirty or forty years. There is little or no growth in stature; teething and walking occur very late; the head is disproportionately large and the ears more so, standing out grotesquely. The eyelids are swollen and the eyes watery and bleary. The skin is waxy in color, cool, dry, and thick; there is a tendency toward skin rash; the hair is sparse and brittle; the nails brittle and striped; and the features after the third or fourth year of life are very characteristic. The nose is flat and wide; the face is bloated; the lips are thick and the tongue so large that it protrudes from the mouth most of the time, resulting in almost constant dribbling. One physiologist has aptly termed such an infant a "dribbling, pot-bellied idiot." The abdomen is rather prominent, and hernia is often observed. Inarticulate sounds instead of words express the cretin's immediate desires for food and drink.

Through a tedious process of training, mental development may occur to a slight degree, vocalization extending to the point of some exchange of primitive thought. The diminution in skin sensibility may be so great that pin pricks may not be felt. In some instances even burns are not felt. The child spends most of its time in sleep; physical movements are tardy; the bones are undeveloped; the legs and arms are thick and short; the temperature is usually lower than normal; the pulse is rather slow; there is constipation; and there may be a loss of bladder and rectal contents during sleep. Much more might be said of this unfortunate condition but this outline is sufficient for our purpose.

As aforementioned, our knowledge of the ductless glands enables us to prevent cretinism through the treatment of the mother before the birth of the child. If, however, this opportunity was overlooked, and the infant is placed under the care of a reputable physician, it is entirely possible to assist Nature through the administration of the thyroid extract of the sheep or some other animal or of thyroxin. The baby can thus be assisted through normal childhood and on to normal adult life.

Milder forms of deficient thyroid secretion may occur in infants and children. Thus, a child may appear to develop satisfactorily until the third or fourth year of life, when further progress becomes tardy. Such a child usually presents a history of having been several months late in teething, walking, and talking; and now there appears an undue sluggishness of physical and mental development. Bed-wetting is continued, and despite all efforts at home training, talking is still more or less infantile. When the sixth or seventh year is reached and school life begun, no progress is observed, and the youngster is relegated to the deficient or mentally backward class. Anemia, undernutrition, a tendency toward too much sleep, a dry, cold skin, and constipation are important evidences of deficient thyroid secretion. Occasionally, the youngster may appear to be obese. Once in a while goiter may be present.

Here, too, the timely intervention of adequate medical treatment will restore physical and mental processes to normal. It might be added that the pathological liar and the child with criminal tendencies

and occasionally with epilepsy are frequently subjects of deficient thyroid secretion or mild cretinism, and can be reclaimed satisfactorily to self and society by timely appropriate treatment.

THE EUGENIC PHASE OF THE QUESTION.

It must be emphasized that adequate treatment of the mother during pregnancy is the ideal procedure in overcoming the above-mentioned type of glandular disorder. I say glandular disorder because disturbed thyroid function implies a varying degree of improper function of all other ductless glands as well. In a personal communication, Professor Charles E. de M. Sajous points out the eugenic significance of this question in the following words:

"Twelve years ago, through praising the efforts of eugenists in behalf of the child of future generations, I expressed the opinion that we physicians should protect the child of today and the unborn but doomed child of tomorrow. I pointed out that the ductless glands, and especially the adrenal, thyroid and pituitary glands, were organs through which vulnerability to disease was transmitted from generation to generation.

"I pointed out also that any acquired or inherited disease which reduces the activity of these glands in a child impairs correspondingly the development and the functional activity of its brain.

"Consider, for example, the case of a family in which three children were born—all idiotic. Clear evidence of glandular deficiency was found in the mother. She was placed under glandular treatment, to protect the child expected in about six months. When that baby was born it was normal. At the age of five it was a fine, bright boy, normal in every respect.

"To realize the practical value of this fact, remember that there may be but one feeble-minded child in a family, while

the other children are perfectly normal. This means that a relative temporary deficiency of the mother's ductless glands may have compromised the mentality of her prospective child.

"The basal metabolism of a mother should be 15 to 25 per cent. above normal about six months before a child is born, Dr. Englebach and Dr. McMahon of St. Louis have pointed out. When it is not, the infant tends to be overweight at birth, and then, to exhibit abnormalities of growth, such as late development of teeth, lateness in learning how to walk and mental deficiency.

"The birth-rate of feeble-minded children can be reduced to a minimum if physicians in general will add a few simple measures to their routine examination of prospective mothers. Public health authorities should cooperate in this to assure the benefit of such examinations to all ranks of society. Thus reduction can be brought about not only in the number of the feeble-minded, but also in the criminal population, half of whom are criminal because feeble-minded.

"These preventive precautions would prove a blessing to hundreds of thousands of parents of such children. It is these parents, in most instances, who are the greatest sufferers.

"Ultimately such precautions can save millions of dollars now spent in every state to harbor unfortunates and protect society."

DEFICIENT THYROID SECRETION IN ADULTS (HYPOTHYROIDISM OR MYXEDEMA).

When thyroid deficiency or hypothyroidism occurs in an adult, the resulting condition is known as myxedema. This term is derived from the peculiar changes of the skin beneath the surface of which there is a deposit of mucinous material. The skin appears swollen, but it does not leave a pit from the pressure of the fingers. This differentiates the swelling of myxedema from that due to dropsical conditions.

What causes the thyroid to lack in functional ability when heretofore it had been acting normally is not always discoverable. Goiter, especially in localities where it is endemic, may in time cause degeneration of the entire thyroid gland, leaving the individual practically thyroidless. Rarely myxedema may follow a severe stage of exophthalmic goiter, the thyroid having undergone undue shrinkage. Such a gland is known as a "burned out" thyroid. The demands made upon the thyroid gland during such infections as influenza, rheumatism, or pneumonia, may be followed during convalescence by extreme depression of the gland with symptoms of myxedema. Frequently repeated pregnancies are another cause of myxedema. At the menopause and in old age, epochs when the thyroid gland ordinarily becomes smaller, the shrinkage of the organ, if extreme, results in myxedema.

Women are approximately six times as susceptible to myxedema as are men. This is due to the more complicated sexual mechanism in woman.

Myxedema resulting from surgical or accidental removal of the thyroid gland is known as *cachexia strumipriva*. The symptoms differ in no way from those of ordinary myxedema excepting that they may appear more promptly.

The symptoms of myxedema come on gradually as a rule, requiring months or years to become quite noticeable. Ordinarily there occurs a gradually increasing impoverishment of memory; there is dulness, some headache, irritability, vague pains in the muscles and joints, and tardiness and awkwardness

of physical movements. It is soon observed that there is an unaccountable desire to sleep too much.

The face becomes dull, apathetic, and somewhat bloated; there is a thickening of the eyelids, lips, nose and tongue; the skin is cold, dry, yellowish-white, and thick. The hair, including the eyelashes and eyebrows, becomes sparse and brittle, and the nails are brittle and crack on slight provocation. Speech is slow and hesitant; the pulse becomes slow, reaching 50 or even 40 per minute; the temperature is a degree or more below normal; and the body weight becomes gradually increased, presenting a gain of twenty to fifty or more pounds in a surprisingly short time. Sweating is practically absent, and eczema and other forms of skin disease may appear. Fatigue is complained of; sense perception is retarded; and questions put to the patient may not be answered for several seconds. Marked constipation and sluggish kidney function with albumin in the urine are now observed. Asthmatic attacks, hernia, varicose veins, and the symptoms of high blood-pressure may add to the patient's difficulties. A low basal metabolism confirms the diagnosis of myxedema, the rate being anywhere between minus 15 and minus 40 per cent. Such individuals are incapable satisfactorily of resisting infections, so that an attack of influenza or some other such disease becomes a major concern. Also, wounds do not heal promptly in the presence of deficient thyroid secretion.

Mild forms of hypothyroidism are somewhat more difficult to recognize. Varying grades of myxedema, or as it is technically known, submyxedema, are en-

countered in the practice of medicine. An important sign is sparsity of hair on the eyebrows. Dry patches upon the skin and an unaccountable increase in weight despite a minimal food intake are additional evidences of beginning hypothyroidism. Other signs and symptoms are dryness of the skin, pallor, the desire for too much sleep, constipation, a reduction in urinary output, undue fatigue, and poor memory. Mild hypothyroidism is almost always associated with an extraordinary tendency to feel chilly. The diagnosis is corroborated by the finding of a lower than normal basal metabolic rate.

CONSERVE YOUR THYROID.

It is evident, from the above remarks, that the thyroid should be conserved in every possible way, not alone from the viewpoint of the prevention of conditions which irritate or depress it, but also on the score of the avoidance of hasty inferences respecting surgical operations. While it is admitted that operations upon the thyroid are often imperative, it is likewise true that in many instances such operations are avoidable. The up-to-date physician, capable of differentiating as a rule between surgical and non-surgical goiters, usually employs non-operative measures in instances of doubt, rather than act upon hasty conclusions. At least two-thirds of all goiter conditions encountered in medicine are amenable to non-operative means. Even in those instances in which thyroid disturbance obviously requires surgery, there was a time when the institution of

non-operative means would have resulted in cure. When it is recalled that the thyroid gland undergoes atrophy on the approach of the forty-fifth year of age or beyond, and that old age itself is partially *due* to shrinking of this organ, it can be seen that the individual approaching middle life is incapable of enjoying good physical and mental health on a mere fraction of thyroid function. Moreover, the instances of cachexia strumipriva are likewise warnings against precipitous thyroid operations. Strange as it may seem, hasty thyroid operations usually are not the fault of the physician, but of patients who insist on speedy cure, believing the cutting off of the lump to be the most desirable solution of the problem. Return of goiter is frequently the reward of haste.

EXCESSIVE THYROID SECRETION (HYPERTHYROIDISM).

Increased thyroid secretion, known as hyperthyroidism, is produced by almost the same causes as are provocative of hypothyroidism. Irrespective of its structural nature, goiter may, after existing harmlessly for several years, suddenly assume activity and cause a saturation of the tissues with too much thyroid secretion. The most usual form of hyperthyroidism occurs in so-called *toxic adenoma,* a condition which will be described later. In exophthalmic goiter there is also a state of hyperthyroidism, but exophthalmic goiter and hyperthyroidism are not synonymous terms, since the evidences of thyroid hyperactivity constitute merely a fraction of the

symptoms presented by a sufferer from exophthalmic goiter. Infections such as influenza, rheumatism, pneumonia, and the like, as well as infections in teeth, tonsils, nasal passages, and intestines, improper hygienic conditions, faulty nutrition, especially excessive meat eating, and the smoking habit, are likewise causative of too much thyroid secretion. In addition to these we might add that undue physical and mental stress and strain incident to school and college duties, as well as intensive business and household trials and tribulations, may, by irritating the thyroid gland, overstep the limits of functional equilibrium and lead to hyperthyroidism.

As already mentioned, a change in thyroid function is not necessarily associated with goiter, but may occur in a gland apparently normal in structure. That form of hyperthyroidism known as toxic adenoma is a distinct entity, developing upon an old-standing simple goiter during middle life. Aside from this, the majority of instances of hyperthyroidism develop goiter sooner or later, unless satisfactory medical treatment is instituted early.

Hyperthyroidism and its symptoms are the antithesis of hypothyroidism or myxedema. There is a gradual onset of nervousness and irritability; sleeplessness is common; the skin is thin, moist, and warm; there is a gradual loss in weight and strength; the mental processes are more or less quickened; the temperature may be slightly increased; the pulse is increased in frequency, ranging anywhere between 90 and 140 or more a minute; diarrhea and increased kidney function are common; and the basal meta-

bolic rate is decidedly increased, varying from plus 15 to plus 60, 80, or even 100 per cent.

A more detailed description of excessive thyroid secretion as well as mention of treatment will be given in later chapters.

COMBINATIONS OF HYPO- AND HYPERTHYROIDISM.

Alternations of hypo- and hyperthyroidism are at times observed in the same individual. Clearcut descriptions of this curious phenomenon are difficult in a brief sketch. During a period of days, weeks, or a month or two, the individual may appear mentally and physically exhilarated, but may complain of sensations of heat, some restlessness, sweating, and insomnia. There may occur some loss in weight, perhaps diarrhea, and other evidences of hyperthyroidism above described. Following these symptoms the reverse gradually appears in which physical and mental depression of varying degree is experienced. There are sensations of chilliness, a desire for excessive sleep, an increase in weight, constipation, dryness of the skin, and unaccountable fatigue. In course of time the symptoms of hyperthyroidism reappear.

Uncommonly, one might observe a combination of hypo- and hyperthyroidism in the same individual at the same time, a veritable conflict of contradictory complaints. This state of affairs characterizes some forms of exopthalmic goiter, more particularly in persons who have undergone thyroid operations.

THE THYROID IS THE FIREMAN OF LIFE'S PROCESSES.

It will be seen that a deficiency of thyroid secretion corresponds to a lessening, and an excess to a flaring up of the fires of life's processes, reflecting upon all physical and mental structures and functions. Circulation, digestion, respiration, secretion, excretion, elimination, the voluntary and involuntary nervous systems, and the heat mechanism of the body, all are depressed by a deficiency and exalted by an excess of thyroid secretion. The thyroid gland is the "fireman" of life's processes, banking down or firing up the fires of metabolism depending upon the quantity of thyroid secretion available. A normal quantity of thyroid secretion yields a happy medium between extremes, resulting in a healthy equilibrium between constructive and destructive forces—between anabolic and catabolic phases of metabolism—between the firing up and the banking down of life's furnace, in which the individual is capable of meeting life's problems successfully.

That the thyroid gland must be regarded as a factor in eugenics, in health, happiness, and longevity of the individual, and a factor to be considered in sociological problems has already been implied.

The most important topic related to thyroid disease is goiter. This we will discuss in the next chapter.

CHAPTER IV.

WHAT IS A GOITER?

A goiter is an enlargement of the thyroid gland. All lumps over the front of the neck are, however, not goiters.

It may appear paradoxical to say that some patients with goiter present no evidences of a lump where it is ordinarily found. It is only through the use of expertly applied methods of a specialist that some goiters are discovered at all. Goiter situated behind the breast bone within the chest cavity, and "aberrant" or "accessory" thyroid goiters (to be mentioned elsewhere) often do not reveal themselves without x-ray examinations. These are the true "inward" goiters. The term "inward" goiter, however, as commonly employed by the layman is rather vague and meaningless.

INDEFINITE OR BORDERLINE GOITERS.

The variations in the size of the normal neck are emphasized when it is observed that during pregnancy the organ may swell into an apparent goiter, and yet, strictly speaking, it may be regarded as being within normal limits. The same may be said of the thyroid of some young women in whom there is a swelling of the gland for a few days each month before the menstrual period. A similar mild thyroid swelling may be seen in women nursing an infant.

It may also occur during the menopause, and, irrespective of sex, during physical and mental exertion, and convalescence from an infectious disease. In a percentage of instances there is an inherited peculiarity of the individual to possess a thyroid gland of maximum normal size or slightly beyond, leading to a suspicion of actual goiter.

Strictly speaking, though these are not goiter, each of the above conditions may actually lead to goiter

Fig. 1.—*1*, Borderline goiter; *2*, appearance of goiter, but in reality a layer of fat over normal thyroid.

formation, so that whenever any doubt exists it is safest to consult an experienced physician for an opinion. This may prevent goiter and perhaps one or more operations in the future. It has rightly been said that goiter is the easiest of all known diseases to prevent.

MEASUREMENT OF THE NECK.

The ancient Greek philosophers who stated that everything in Nature is in a state of flux or change knew what they were talking about. Of the two billion individuals existing on our planet, no two are

exactly alike. This is likewise true of the different parts of the body. No two necks are alike, and there is no standard of measurement to assist us in an opinion as to the presence or absence of goiter. A short neck is apt to be one of apparently great diameter, and *vice versa,* the thyroid gland itself being normal or otherwise. Necks also vary in circumference according to hereditary traits, emaciation or obesity respectively, unequal distribution of muscular development or of fatty tissue, and other peculiarities of the individual. An adult normal neck circumference may vary from eleven to sixteen inches, and taking into account extremes of emaciation or of obesity, the variations in size may be still greater.

Circumferential measurements are useful only when a patient with goiter having been under treatment for some time can be measured repeatedly to note progress. In an individual applying for the first examination of the neck, it is the experience of the physician rather than the neck measurement that yields an opinion. With regard to goiters suspected of being located in the chest behind the breast bone, it must be repeated that x-ray examinations are of vital importance.

The method of applying the tape measure in a goiter patient is important. The person measured must stand erect with the chin directly forward, breathing naturally. The rear level of the tape measure should be placed one inch above the most prominent vertebra (the seventh cervical). The tape measure is then brought forward over the most

prominent portion of the goiter, and the circumference in centimeters or in inches is noted.

THE ELEMENT OF PERSONAL EQUATION.

In mild cases, even doctors may differ as to whether goiter actually exists. A neck regarded as normal in a goiter belt such as about the Great Lakes may be looked upon as goitrous in New York or Philadelphia. Conversely, a beginning goiter in an individual in Philadelphia may be considered perfectly normal should the patient consult a physician in Chicago or in Erie, Pa. Since it is frequently difficult to decide whether slight thyroid swellings are goitrous, physicians even in the same locality may differ regarding the presence or absence of goiter in a given patient. A casual perusal of a large series of goiter patients referred to me discloses the fact that *in approximately one patient in fifteen goiter did not exist.*

IMAGINARY *VERSUS* REAL GOITER.

First year medical students looking into a volume of "The Practice of Medicine" for the first time often become obsessed with the idea that they are suffering with at least a dozen of the illnesses described. So much has recently been written in magazines and newspapers on the thyroid and on goiter that the impressionable man or woman, especially if there has been a case of goiter in the family, may easily be led to the belief that he or she is suffering with either an impending or a real goiter. The goiter question has

received so much publicity within recent years that nearly every one is overly alert with reference to the front aspect of the neck. The slightest degree of convexity of the neck which may in no way indicate goiter is apt to lead to alarm and an almost hysterical desire for quick treatment. While it is far better to err on the safe side and receive treatment for an early rather than a well advanced thyroid enlargement, there is also a harmful aspect to this anxiety. Advertising quacks prey upon the gullible public and are apt to scare people into believing in the actual presence of that which exists only in the imagination, and what is worse, into the taking of harmful drugs.

On the other hand, to walk about in fear of goiter without possession of expert knowledge on this subject is dangerous. To state, as is often done in the case of young girls, that "this is just a swelling of your thyroid and will disappear of itself; leave it alone," or, "just take a little iodine, and you will find that the neck will give you no bother," may lead to serious trouble and frequently to the tragic picture of exophthalmic goiter. Nature often errs with respect to the thyroid gland, and what is now a very early, simple goiter easily cleared up by intelligent treatment, may, if neglected, become enormous in size and require surgery, with its risks and scar formation. To take iodine in an offhand fashion without due consideration of its need, especially as to whether an actual deficiency of iodine is the cause of this situation, is again inviting trouble.

WHAT IS *NOT* GOITER.

Let us now mention a few conditions occasionally regarded as goiter but which are not goiter:

The apparent thyroid swelling in a child or growing adolescent and occasionally in an adult who is rather undernourished and anemic is not goiter. There is an absence of the fatty layer ordinarily present over the thyroid gland, resulting in an undue prominence of the normal organ, lending the appearance of goiter.

The reverse is occasionally seen. An individual may have so much fat about the neck as to present a fold of it over the normal thyroid gland, which may be mistaken for goiter.

A prominent Adam's apple, if present in a woman, occasionally leads to a fixed idea that it is goiter.

The lymphatic glands ordinarily situated on the side of the neck may become swollen and occasionally resemble goiter if they extend forward enough to encroach upon the area corresponding to the location of the thyroid gland. Also, conditions technically known as *cysts* of the neck may be mistaken for goiter.

A curious but important condition occasionally regarded as goiter occurs in nervous, hysterical women, and is known technically as *globus hystericus*. There is really nothing wrong with the throat, except a mere *sensation* of choking, resulting from spasmodic contraction of muscles about the larynx.

CHAPTER V.

VARIETIES OF GOITER.

In order that accurate treatment be applied and recovery assured, it is extremely important to ascertain the *kind* of goiter with which we are concerned. The safest procedure for the layman is to consult a physician experienced in this work, so that the whether and the why of medical or of surgical treatment might be clearly understood.

In this chapter we shall endeavor to classify goiters into various types, omitting the rare forms of thyroid enlargement, and employing such terms and explanations as may be comprehensible to the lay reader.

From the viewpoint of the presence or absence of bodily symptoms, goiter may be divided into two types: *Simple or non-toxic* and *toxic*.

A *simple or non-toxic* goiter is an enlargement of the thyroid gland which is not associated with bodily symptoms. Such a goiter may, however, produce pressure symptoms because of undue size or unfortunate location of the mass behind the breast bone within the chest. If this occurs, the mass is then known as a substernal or intrathoracic goiter.

A *toxic* goiter is an enlargement of the thyroid gland productive of bodily symptoms because the mass secretes more thyroid substance than is good for the individual. Nervousness, trembling, sleeplessness, sweating, rapid heart, palpitation, loss in

weight, weakness, general physical and mental inefficiency of varying degree and an increased basal metabolism rate reveal toxicity of a goiter.

Toxic goiter and simple goiter present no marks of difference at the neck itself. In other words, there is nothing in the examination of the thyroid swelling alone that would serve to indicate the change from a simple goiter into one that is toxic.

Here we are not including exophthalmic goiter which, though in a sense a toxic goiter, is in reality to be classified under constitutional conditions and will be discussed in Part II of this book.

The terms *hyperthyroidism, thyrotoxicosis,* and *thyrotoxemia* are frequently employed to designate the totality of symptoms presented by a patient suffering with toxic goiter.

From the viewpoint of pathology (morbid or diseased *structure* of the thyroid gland), goiter may be again classified into two types: *tumor* masses and masses which are *not tumors.*

GOITERS WHICH ARE TUMOR MASSES (SURGICAL GOITER).

This classification is of importance, since these goiters invariably require operation. Among tumor goiters are:

1. Adenomatous goiter (a tumor consisting of gland-like structure).

2. Cystic goiter (a sac of varying size containing a gelatinous substance).

3. Fibrous goiter (a tumor consisting of fibrous material).

4. Any combination of the above.

5. Carcinoma and sarcoma of the thyroid (malignant disease).

The above types of goiter may or may not be associated with thyroid toxicity or hyperthyroidism, hence are either simple or toxic. Though they are occasionally seen in the boy or girl, this is very exceptional. The patient suffering with a tumorous

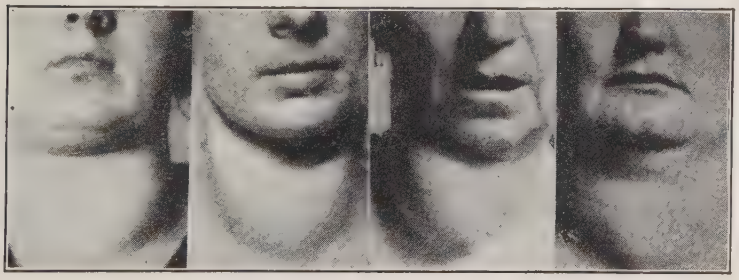

Fig. 2.—Large tumor goiters (adenoma and cysts) requiring operation.

goiter is usually considerably past the age of twenty-one.

A goiter of this sort is usually a thyroid swelling which has been neglected. As a rule, the individual traces the lump back to some years before, when it was small, soft and compressible. Were proper treatment instituted at that time cure would have been an easy matter, for nearly all goiters *begin* as non-tumorous enlargements yielding to medical treatment. It is the *time element* which effects a change in the structure of thyroid enlargements, converting non-surgical goiters into those requiring operation.

GOITERS WHICH ARE NOT TUMOR MASSES (NON-SURGICAL GOITER).

These are thyroid swellings which should not be operated upon and are successfully treated without surgery, unless the mass dips down into the chest cavity. The non-tumorous goiters are:

1. Hypertrophic goiter (enlargement of the thyroid from additional normal structure).

Fig. 3.—Non-tumorous goiters (hypertrophic and colloid goiter) not requiring operation.

2. Colloid goiter (thyroid swelling due to excessive colloid[1] accumulation).

3. Hyperplastic goiter of puberty and adolescence (exaggerated normal structure and blood supply of the thyroid).

4. Hyperplastic goiter of exophthalmic goiter (Graves's or Basedow's disease).

As already mentioned, exophthalmic goiter will be discussed elsewhere. Hypertrophic, colloid, and the hyperplastic goiter of puberty or adolescence are usually non-toxic. Occasionally, however, through un-

[1] See Chapter I for description of colloid.

scrupulous iodine treatment or the taking of thyroid extract without expert advice, or for other reasons previously described, these goiters may likewise become toxic. This, however, does not occasion the need for surgery.

The above mentioned goiters are usually of recent origin, having existed from a few weeks or months to a year or two. Occasionally a goiter of this sort may continue on for several years without undergoing tumor-like changes. If proper treatment is not instituted, non-tumorous goiters usually change, become tumors, and then operative treatment becomes necessary. Hence it is best never to neglect a swelling of the thyroid gland, no matter how trivial it may appear to be.

GOITER TYPES ACCORDING TO GEOGRAPHICAL LOCATION.

Depending upon whether the aforementioned types of goiter are due to goiter belt conditions, or not, the term *endemic* or *sporadic* goiter, respectively, may be applied. Exophthalmic goiter is the exception, and is never endemic.

An *endemic* goiter is an enlargement of the thyroid gland seen in great numbers in certain regions of the world known as goiter belts. Aside from the fact that the patient resides in a region where goiter is unduly prevalent, the lump itself shows nothing to indicate its endemic nature. Endemic goiters and those originating anywhere else are exactly alike in appearance.

We must here insist that though a case of goiter may casually be termed an endemic goiter because the patient happens to reside in a goiter belt, even this goiter may be of non-endemic origin. Hence the goiter originating in an endemic region, though likely an endemic goiter, is not necessarily so. The fact that you are a resident of Chicago (a goiter belt), and happen to acquire a goiter, does not preclude the possibility of your acquiring a goiter were you a resident of Philadelphia.

A *sporadic* goiter is an enlargement of the thyroid gland occurring in persons residing in any part of the world and most likely due not to goiter belt conditions, but to more complex causes mentioned in Chapter VI.

MISCELLANEOUS GOITER TYPES.

According to whether a person is born with a goiter or acquires it later on in life, such terms as *congenital* goiter and *acquired* goiter, respectively, may be employed.

A *toxic adenoma* (the most usual variety of toxic goiter) is an adenomatous goiter that is poisoning the body through hyperthyroidism. Since toxic adenoma is frequently confused with the totally different disease known as exophthalmic goiter, it would be well here to describe it in more detail. An adenoma begins as a non-toxic or simple non-tumorous goiter. The usual history of the case is as follows: Beginning as a simple, soft swelling of the thyroid gland (hypertrophy) or as a somewhat harder mass (colloid goiter), occurring during the growing stage of the

young girl[1] (premenstrual period) or during pregnancy, or due to other causes, the simple, non-tumorous goiter persists, and within two or three years may increase in size. In course of time the swelling is evident to everyone and has become more localized and rather hard and resistent to the touch. This is most often due to neglect, and occasionally to the taking of iodine. Formerly consisting of structures quite capable of cure through properly applied non-operative measures, this lump has now changed into an

Fig. 4.—Goiters in men.

adenoma or tumor which requires operative attention. Still there are no constitutional complaints; the body does not suffer unless the mass is large enough to produce pressure symptoms. Years pass, the lump may or may not grow still larger; but it usually does. When it has existed for a decade or more, the lump ceases to be "simple" and sensations of weakness may be complained of. Palpitation is experienced and may be associated with a deficiency

[1] A growing boy may present a thyroid enlargement which is capable of going through the same process, but toxicity is rather uncommon in the male.

of appetite, and, in the course of time, a substantial loss in weight. Trembling throughout the body, especially of the outstretched fingers, nervousness, impatience, and general indisposition with incapability of physical and mental effort become marked, and in the course of an added few months or a year or two, this person has become a confirmed invalid. A basal metabolism test reveals a considerable elevation, the rate being anywhere between plus 15 and plus 80 or even more. What has happened? The formerly simple adenoma is now sending into the blood a large quantity of secretion which is poisoning the entire body. The average time elapsing between the onset of a goiter and its development into toxic adenoma is about 15 years.

A toxic adenoma differs in many respects from exophthalmic goiter. Briefly stated, we might differentiate the two conditions as follows:

Toxic Adenoma (*Hyperthyroidism*).	Exophthalmic Goiter (*Graves's Disease*).
1. Usually occurs in well established adult life.	1. Usually occurs in young adults.
2. Goiter is of long duration.	2. Goiter is of recent origin.
3. Goiter is of tumor structure and is often large, nodular and does not throb.	3. Goiter is not of tumor structure and is comparatively small, evenly distributed and throbs.
4. No bulging of the eyes.	4. Bulging of the eyes in 60 to 70 per cent. of patients.
5. Comparatively little emotionalism, mental excitement and digestive disturbances.	5. Considerable emotionalism, mental excitement and digestive disturbances.

Toxic Adenoma (*Hyperthyroidism*).	Exophthalmic Goiter (*Graves's Disease*).
6. Individual has not been nervous prior to onset of toxicity, but may present history of *simple* goiter in the family.	6. Individual has been of a nervous temperament throughout life, and may present a history of nervousness or of exophthalmic goiter in the family.
7. High blood-pressure commonly noted.	7. Low blood-pressure commonly noted.
8. Operation usually successful.	8. Operation usually a failure.

An adenoma is not the only simple goiter which may become toxic. The term toxic adenoma applies itself also to cystic goiters and other tumor-like thyroid enlargements which behave in the manner above described.

Even non-tumorous goiters may begin to secrete excessively and become toxic. These occur in much younger persons, do not follow the prolonged history above detailed, and can be successfully managed without surgery.

INTRATHORACIC GOITER.

An *intrathoracic, substernal,* or *retrosternal* goiter (all three terms imply the same condition) is an enlargement of the thyroid gland which, irrespective of its structure, simplicity, or toxicity, happens to be partially or entirely located behind the breast bone within the thoracic cavity. Any kind of goiter may dip down into the chest. This unfortunate location may be the result of several conditions:

In short-necked persons, the middle portion or isthmus of the thyroid gland and often the entire organ is ordinarily situated behind the upper portion of the breast bone. Should a goiter arise in such a gland, it would be invisible, since it would be located within the chest cavity. But short-necked people are by no means the only ones presenting intrathoracic goiter. It is possible for *any* goiter to become so large or grow downward to such extent as to dip down into the chest cavity behind the breast bone. Depending upon the degree of such downward extension of a goiter, we might state that the mass is a *partial* or a *complete* substernal or intrathoracic goiter.

Since these goiters, by their vicarious position, act in much the same fashion as tumors within the chest, they may lead to serious complications. The thorax already contains the organs endowed it by Nature, and any intrusion by goiter or other masses produces pressure symptoms. Pressure upon the respiratory and circulatory structures, the esophagus, and upon other important structures and nerves leads to shortness in breath, choking sensations, varying degrees of difficult swallowing, and a condition known as "mechanical goiter heart." This does not apply to a heart sped up by hyperthyroidism, but to a heart embarrassed in its function because of pressure by the goiter upon the great vessels issuing from its base, resulting in undue rapidity and irregularity of the heart's action, palpitation, and many other serious phenomena. These, if unduly continued, may lead to extreme enlargement of the heart. Should the lump

so situated become toxic, the heart is doubly punished. Actual serious disease of the organ may thus occur. Such goiters must receive early surgical attention. The diagnosis of intrathoracic goiter usually requires confirmation by an x-ray study.

There is an interesting sidelight on the subject of substernal or intrathoracic goiter. I have reference to a goiter of medium size, quite visible in the *usual* position, which some time later descends into the

Fig. 5.—Goiters extending largely behind the breast bone into the chest cavity (retrosternal or intrathoracic goiters).

chest not necessarily because of increase in size, but through gravity. When the goiter has completely disappeared from view, the patient may *appear* cured. If this happens while under treatment by a quack doctor or some advertised medicine, the latter is given credit for the apparent "miraculous" recovery. Some years later, however, this patient begins to experience shortness in breath, palpitation, high blood-pressure, perhaps symptoms of asthma, and marked general indisposition. An x-ray examination of the chest easily reveals the true state of affairs.

ABERRANT OR ACCESSORY GOITER.

Even anatomy has its exceptions, and sometimes we find masses of thyroid structure located not in the front part of the neck, but almost anywhere else in the body. These masses are *aberrant* or *accessory* thyroids, and if they undergo enlargement, are known as *aberrant* or *accessory* goiters. These may occur at the base of the tongue, in the chest in relation with the heart or trachea, in the neighborhood of the ovaries, and elsewhere. These masses may likewise become toxic. It is exceedingly difficult at times to diagnose the presence of an accessory goiter.

IODINE AND THYROID EXTRACT HYPERTHYROIDISM.

Persons suffering with a simple or non-toxic goiter may convert it into a toxic goiter by the taking of iodine or of thyroid extract. Even exophthalmic goiter may thus be instigated. The unfortunate trend of today on the part of women to apply to the drug counter for goiter remedies and fat-reducing medicines is responsible for many tragic conditions which common sense and education alone can avert.

We shall now discuss the various known causes of goiter.

CHAPTER VI.

CAUSES OF SIMPLE SPORADIC GOITER.

We shall here discuss the simple or non-toxic goiter not necessarily caused by goiter belt conditions but seen anywhere and everywhere and known technically as simple sporadic goiter.

GOITER EXISTS IN ALMOST ALL ANIMAL LIFE.

Man is not alone the subject of goiter. Almost all animal life is susceptible. Fish, fowl, dogs, cats, rats, horses, goats, sheep, hogs, camels, all are liable to goiter and frequently present this malady in great numbers. Though wild animals are less susceptible to thyroid enlargement, lions and tigers have been reported to present goiter. In certain localities of the world human beings may be quite liable to goiter formation, while lower animals are immune, and *vice versa*. As a rule, however, man and animals are affected by similar conditions.

The cause of goiter has interested humanity for many centuries. Numerous theories have been advanced to explain the reasons for thyroid enlargement; many of these are grotesque in their implications, while few are quite acceptable. Despite modern progress, even today we are still somewhat in the dark on this subject, and there are many patients suffering with goiter the cause of which is not discoverable.

EPIDEMICS OF GOITER.

On rare occasions it is noted that an epidemic of goiter occurs in a locality where goiter has not been frequent. During one of Captain Cook's voyages an outbreak of goiter occurred among his men. Among other reports on record is that of Adams and Crossley[1] of an outbreak of goiter occurring in one cottage out of a colony of nine constituting a Children's Cottage Home situated near the village of Wardle. There were eight occupants in this cottage, all boys between the ages of four and ten, and all were affected. The adult caretakers were immune. An epidemic of measles among these children seems to have been the exciting cause of this peculiar outbreak.

INFECTIONS IN GOITER CAUSATION.

From the above it can be deduced that diseases such as occur in childhood (measles, scarlet fever, diphtheria, mumps, and the like) and infections in adults (influenza, rheumatic fever, typhoid fever, pneumonia, syphilis) as well as such focal infections as are liable to occur in teeth, tonsils, and along the digestive tract, are capable of stimulating the thyroid gland to become larger and finally goitrous. During the Spanish influenza epidemic in 1918, an unusual number of goiters were observed to follow convalescence from this disease.

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[1] E. W. Adams and H. N. Crossley: Lancet (London), 1923, *2*, 500.

DISEASED TONSILS AND GOITER.

However, diseased tonsils are less often the cause of goiter than is commonly believed. The presence in the same individual of both goiter and diseased tonsils is no reason to conclude that the tonsils were causatively related to the goiter. The fact is that there are more goiter patients in existence with *normal* tonsils than with *diseased* tonsils. However, the lack of proof to the effect that diseased tonsils were productive of goiter is no reason why the tonsils should remain. On general logical principles, all diseased tonsils should rightly be considered a menace to the thyroid and other ductless glands of the body and should be removed at the earliest feasible moment. This, of course, should in the last analysis be decided upon by the physician in charge.

Even in instances in which it is reasonably certain that diseased tonsils are the cause of goiter, it is well not to depend upon tonsil removal alone as a cure. Once an infection in tonsils or teeth has set up a thyroid enlargement, chances are nineteen to one that the removal of the infection, whether it be teeth or tonsils, will have no effect upon the already established goiter. Additional measures more directly applied to the thyroid must be instituted in the interests of recovery.

GOITER IS NOT CONTAGIOUS.

Despite the possibility of acquiring goiter through infected water or through general or focal infections of the individual, goiter is not contagious. One

person cannot "catch" goiter from another. Goiter is no more capable of being transmitted from person to person than is headache or indigestion. The fact that more than one member of a family may have goiter, means not contagion, but the presence of a common family trait indicating mere susceptibility to goiter, which, by the way, can be overcome.

HEREDITARY INFLUENCES.

Hereditary influences are a potent cause of goiter. In some families as many as six and more members develop goiter in varying degree. No definite reason has yet been offered to explain why, in one family goiter is almost unheard of, while in another residing in the same locality and apparently living the same kind of existence, there are two or more members suffering with goiter. No less than 30 per cent. of my patients present a history of goiter in other members of the family.[1] It is usually a case of mothers and daughters and often several generations of females in which goiter is present in varying severity. I have at this writing under my care several families of mothers and three or four daughters, all of whom are afflicted with goiter.

PERSONAL SUSCEPTIBILITY TO GOITER.

There are some persons who, aside from heredity, are peculiarly susceptible to goiter. The thyroid

[1] B. Lloyd points out that 46 per cent. of children of goitrous parents in Chicago have goiter. (Ann. Clin. Med., Baltimore, 1924, *3*, 275.)

gland seems incapable of adapting itself to the various normal physical and mental demands made upon it. Sooner or later the organ becomes unduly visible and in the course of time it is definitely swollen into goiter formation. Within a few months or a year or two this swelling is quite noticeable to all and embarrassing to the individual concerned. Women are not alone in this class of individuals, for a large percentage of men possess this peculiarity.

INFLUENCE OF SEX ON GOITER INCIDENCE.

Since the thyroid gland is intimately related to the sexual mechanism, and since this mechanism is rather complex in the female and subject to the physiological variations of menstruation, pregnancy, lactation, and the menopause, these conditions necessarily constitute frequent stress and strain upon the thyroid structure and function. As a result one is very apt to notice a slight thyroid swelling during the above-mentioned conditions in practically all girls and women. Indeed, it is believed that a thyroid gland in the female which does not undergo *some* enlargement during menstruation and pregnancy, be it ever so inconspicuous and transitory, is abnormal. In this relation the thyroid in the female has frequently been regarded as "the uterus of the neck." This swelling, should it overstep the usual bounds, is not so apt to disappear. Nature frequently errs with the thyroid gland, and too often do we observe in young girls about to undergo the changes incident to puberty, a premonitory thyroid swelling that is somewhat alarming. More

often, this occurs during pregnancy and frequently also during the menopause. While these swellings may be of temporary duration, disappearing in the course of time, they are just as liable to persist and become disfiguring and a menace to health. Occasionally some disease of the female pelvis, such as a fibroid of the uterus, appears to be the cause of goiter.

Thus we have the cause of the frequency of goiter in females. The incidence of goiter in women as compared to men is approximately six or eight to one.

INFLUENCE OF RACE ON GOITER.

No race is immune to goiter unless racial immunity is explainable on the grounds of geographical location and dietary or other habits of life. The Japanese, for instance, present a lessened goiter incidence which is believed to be due to the inclusion in their diet of sea weed which is rich in iodine content. Races of people living in close proximity to the sea appear to suffer less with goiter than those who live far inland. Again, people who subsist largely on flesh foods are more liable to goiter, as such foods produce an undue strain upon the thyroid function. Races of individuals whose habits are more or less unhygienic, as, for example, the vast majority of the Hindus in India present goiter in large numbers.

UNDERNUTRITION AND GOITER FORMATION.

Improper quality and quantity of feeding is frequently overlooked as a cause of goiter. Excessive

meat eating, the taking of spices and condiments, an insufficiency of food intake with resulting anemia, deficient intestinal residue and autointoxication, are elements demanding attention. Anemia and underweight are the usual results of undernutrition. The bodily resistance being lowered, it remains for the thyroid gland to assume the undue burden of protection against the inroads of disease. Overwork of the thyroid increases its size, and soon the swelling amounts to definite goiter formation.

SUDDEN ONSET OF GOITER.

The usual onset of goiter, that is, the time elapsing between a normal appearing thyroid gland and the change into definite goiter varies with individuals. Usually it is a matter of months or years. Once in a while, a patient will insist that a goiter developed over night. For example, a nurse who was referred to me claimed that she suddenly discovered the lump on her neck after turning a rather heavy patient about in bed. In another instance, the patient claimed to have developed a goiter within several hours after the onset of a cold. In another, a Civil War veteran of 78, it was claimed that no goiter was observed prior to a certain morning when his daughter, while shaving him, suddenly discovered the large lump on his neck.

While a goiter may develop within a day or a week following an attack of influenza or some other infection, in most cases in which a history of the sudden onset of goiter is given it can be assumed

that the lump had really been present for weeks before, but that it was not brought to the patient's attention until its growth became conspicuous. On the other hand, there is such a thing as an inflammation of the thyroid (thyroiditis), which could develop within several hours and is usually produced by an infection elsewhere in the body. In a case of this sort, it is to be expected that the patient would complain of pain within the lump, and would present such symptoms as chilliness, feverishness, and other evidences of active inflammation. In the absence of such symptoms the claim that a goiter developed over night is usually to be called into question.[1]

USUAL COURSE OF GOITER DEVELOPMENT.

As above mentioned, goiter usually requires months or years for development. The young girl, and less often the boy, may develop a fulness of the neck during or several months prior to the development of puberty. This swelling may occur to within normal limits or may be present in such exaggerated form as to attract attention. The firm establishment of the changes of puberty results, as a general rule, in the disappearance of this swelling. This occurs within approximately two or three years. In a goodly percentage of cases, however, Nature errs;

[1] Occasionally in short-necked individuals goiter may develop behind the breast bone within the chest cavity, without the knowledge of the individual, and there remain for months or years. An extension *upward* of the mass through an increase in its growth, or an attack of cough, may suddenly bring the lump into view. The individual would then claim that the goiter developed suddenly.

the goiter refuses to recede and may become permanent. For this reason it is dangerous to neglect any swelling of the thyroid.

The goiter developing from pregnancy presents a somewhat shorter period of evolution. During the fourth to the sixth month of pregnancy the thyroid begins to become noticeable and within an added several weeks it may become large enough to cause concern. As pregnancy approaches its termination and the baby is born the goiter has reached its maximum size, varying from a mere slight swelling to a rather conspicuous lump on the neck. Usually the swelling gradually disappears by the time the baby is five or six months old. This is especially true if nursing was stopped early. In perhaps twenty per cent. of cases, however, the thyroid swelling persists, and the individual is threatened with goiter in after life.

The prevention and cure of goiter of this sort is an easy matter and is discussed in another chapter.

We might add that the thyroid swelling of pregnancy is due to the demands made upon the gland by the growing fetus, the unborn child requiring the secretion for proper development. Hence the thyroid swelling, if within moderate limits, is a welcome sign indicating a good physiological response to existing conditions. Also, a moderate thyroid swelling in a pregnant woman means the reduction of troublesome vomiting and is an influence against kidney and liver disturbances and convulsions.

SUMMARY.

Goiter *not* due to goiter belt conditions is of complex origin. Among the most important discoverable causes of sporadic goiter are hereditary influences, the physiological changes incident to puberty, adolescence, menstruation, pregnancy, the menopause, disease of the female reproductive organs; such general infectious diseases as influenza, rheumatic fever, pneumonia, typhoid fever and the like; occasionally the diseases of childhood, as measles, scarlet fever and diphtheria; less often such focal infections as occur in teeth, tonsils and the intestinal tract; and finally, unhygienic conditions of the person or environments and improper quality or insufficient quantity of food, with underweight and anemia. We must bear in mind that in many goiter sufferers the cause of the lump on the neck, despite expert investigation, is not discoverable, and is perforce attributable to a peculiar individual susceptibility to goiter.

The causes of goiter are by no means entirely known. We must conclude with a recent writer who remarks that "thyroid disease is a many-headed monster that has often been attacked in the past as if it were a uniform single entity to be overcome. At no time has the importance of accurate differential diagnosis been more urgent than in these days, when not only medical but also lay publications resound the importance of goiter prevention . . ."

CHAPTER VII.

GOITER BELTS AND ENDEMIC GOITER.

Goiter, especially that form of it which occurs in great numbers in certain regions of the world, has been discussed as far back as history records. An ancient Hindu collection of writings of the year 2000 B. C. prescribes forms of treatment for goiter. Caesar observed the frequent occurrence of big neck as characteristic of the Gauls.

GOITER PRESENT EVERYWHERE.

There is scarcely a part of the world from which goiter is absent. Paracelsus was the first to stress the relationship between goiter and cretinism in Switzerland. Hathaway[1] remarks that as early as 1874 Baillarger, of the French Commission, estimated that there were a half million cases of goiter in France alone, in addition to one hundred and twenty thousand cretins.

Areas about the Alps Mountains, including Switzerland, France, Italy, and Germany; sections about the Himalayan Mountains embracing large areas of India and China; the Andes Plateau in South America; sections about the Great Lakes and the St. Lawrence River regions both on the United States and Canadian sides; the western mountain ranges

[1] J. C. Hathaway: Amer. Jour. Med. Sci., 1925, *170*, 1.

extending along the entire length of North America, including particularly our Northwestern States; all these are known as goiter belts. Barton's[1] book on goiter among the American Indians along the shores of Lake Ontario and Lake Erie is interesting. McCarrison[2] remarks that in some of the villages in Himalayan India there is scarcely a man, woman, or child who is not suffering from goiter.

Schittenhelm and Weichardt[3] remark that the incidence of goiter in southern Bavaria is between 77 and 89 per cent. of the total population. DeQuervain, quoted by Wegelin,[4] states that in Berne, Switzerland, 75 per cent. of the six year old children are already suffering with goiter, and by the time they reach the sixteenth year the percentage rises to 94. Kreuter[5] examined in Munich 1840 school children varying in age between three and nineteen years, and found that 59 per cent. presented goiter.

In this country Kerr[6] examined 310 Indian students representing forty-three tribes from six states and Alaska, and found that 10.6 per cent. showed thyroid enlargement. He is of the opinion that in full-blooded Indians the incidence of goiter is low as compared with the Caucasians. Rush and Jones[7]

[1] B. S. Barton: A Memoir Concerning the Disease of Goiter as It Prevails in Different Parts of North America, 1900.

[2] Robert McCarrison: The Thyroid Gland, Wm. Wood & Co.

[3] Schittenhelm and Weichardt: Der endemische Kropf mit besonderer Berüchsichtigung des Verkommens in Königreich Bayern, J. Springer, Berlin, 1912.

[4] C. Wegelin: Internat. Clin. (Phila.), 1926 (Series 36), *4*, 38.

[5] A. Kreuter: Münch. Med. Wchnschr., 1922, *69*, 47.

[6] W. T. Kerr: Northwestern Medicine (Seattle), 1919, *18*, 110.

[7] H. P. Rush and L. T. Jones: Endocrinology (Los Angeles), 1925, *9*, 353.

believe that the incidence of goiter among American Indians runs for the most part parallel to the distribution among the whites, the exception being noticed in the Pacific Northwest, where the diet of Indians contains more iodine through the taking of great quantities of salmon, with resulting lowered incidence of goiter.

GOITER A NATIONAL PROBLEM.

So vital is the goiter problem in some sections of the world that it constitutes a national question. In Switzerland particularly is this true, for it is a question not alone of goiter but of certain far-reaching consequences therefrom, such as cretinism, imbecility, and frequently deaf-mutism.

In certain portions of British Columbia the goiter question appears to be rather serious. For instance, Waller[1] observes that in the Pembertson Meadows, a valley in British Columbia, nearly everybody is affected with goiter, the endemic apparently being due to an infection of the water. Babies are usually born goitrous. If fed on condensed milk and water that has been boiled, they are freed from goiter, but those fed on milk produced in the district soon become infected. In this section nearly every animal is born with goiter. Pregnant cows here imported produce goitrous calves, many of which die through extreme weakness. Most of the litters of new-born pigs are hairless, and many do not survive. Fowls die with big goiters.

[1] H. E. Waller: New York Med. Jour., 1922, *105*, 325.

Soils in the immediate vicinity of the melting ice of the glacial period are apparently the greatest endemic districts. Sections of the world far inland are more prone to endemicity than those near the sea coast. Exceptions to this rule are numerous. Hercus, Benson and Carter[1] of the University of Otago, New Zealand, state that in their country goiter is widely prevalent. Thirty-one per cent. of the school children present thyroid enlargement, and in some areas the goiter incidence reaches sixty per cent.

GEOGRAPHICAL INFLUENCE ON TYPES OF GOITER.

Generally speaking, exophthalmic goiter or Graves's disease is never endemic and is less prevalent in endemic goiter districts than elsewhere. The nearer the seashore, the greater the incidence of exophthalmic goiter and the lesser the prevalence of simple goiter. The converse is likewise true, *viz.:* The farther inland the location the greater the incidence of simple goiter and the lesser that of exophthalmic goiter.

Barring a consideration of exophthalmic goiter, which is a totally different disease, the type of goiter occurring in goiter belts differs little from goiter seen elsewhere. It is most often seen in children during adolescence, though many adults are afflicted chiefly through having neglected the swelling during early life. It is more prevalent in girls than in boys, the relative frequency being somewhere between four and eight to one. The structure of the goiter is

[1] Hercus, Benson and Carter: Medical Press and Circular, April 21, 1926.

simple hypertrophy or colloid infiltration, less often hyperplasia, and occasionally a combination of these. The difference between simple goiter seen anywhere and that seen in goiter belts is that in the latter there are more apt to be seen evidences of hypothyroidism (cretinism, myxedema, deaf-mutism), and that adenomatous and cystic changes may occur early, even in eight to ten year old children.[1] Most often, however, these changes to cyst and tumor formation occur toward the eighteenth or twentieth year. Toxicity and malignant changes are seen with the same frequency or infrequency as in non-endemic (sporadic) goiter.

ENDEMIC GOITER IN THE UNITED STATES.

Endemic goiter in the United States is discussed in detail in the next chapter. We might here mention the work of McClendon and Williams[2] who made an analysis of the water in various zones of the United States to determine the relationship of iodine content to endemic goiter found in drafted men. The total number of men examined was 2,500,000. In the zones in which the greatest numbers of goiters were present (15.30 per 1000 men) corresponding to the Northwestern States and about the Great Lakes, the iodine in parts per billion of water was 0.01 to 0.1; in the next most important zone, corresponding to states bordering upon the first zone (5.15 per 1000

[1] These constitutional symptoms and precocious pathological changes are rare in this country but common in the Alps Mountain regions.

[2] J. F. McClendon and Agnes Williams: Jour. Amer. Med. Assoc., 1923, *80*, 600.

men), the iodine in the water was 0.015 to 1.2; in the third zone extending farther off, stretching across the country (1.5 goiters per 1000 men), the iodine content of the water was 0.06 to 9; and the fourth zone, including southern states and the fringe of states nearest the Atlantic Ocean (0.1 goiters per 1000 men) the iodine content was 1.4 parts per ten billion parts of water. It is therefore concluded that in this country the cause of endemic goiter is an insufficiency of iodine in the drinking water of the affected areas. On the other hand, there are some who believe that the cause of endemic goiter is not due entirely to iodine deficiency but that other factors, especially infection of the water with germs, play an important causative rôle.

CHAPTER VIII.

ENDEMIC GOITER IN THE UNITED STATES.

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INTRODUCTION.

Endemic goiter, otherwise known as the simple enlargement of the thyroid gland occurring in individuals residing in localities known as goiter belts, is a well-known malady in the United States. In some sections of the country the characteristic fulness of the neck which marks the existence of the disease is so commonplace as to be regarded as a natural rather than an abnormal condition. Fortunately endemic goiter does not prevail with as great intensity in the United States as, for instance, in sections of Switzerland, Austria and India. In these latter countries with high prevalence rates, goiter is something more than a mere deformity of the neck. It is now known that endemic goiter is closely associated with mental and physical degeneration, especially cretinism, deaf-mutism and idiocy. While it is difficult to associate simple goiter with degenerative diseases in the United States, the possibility of such remote and far reaching action must nevertheless receive serious consideration.

The announcement by Marine that endemic goiter can easily be prevented, and the confirmation of his experimental work by numerous independent inves-

tigators, both here and abroad, has greatly stimulated interest in the practical phases of the problem. The method whereby endemic goiter may be prevented is so simple as to appear impracticable. However, the principles upon which the procedure is based were not evolved suddenly. Only after research of the most painstaking character were the investigators enabled to evolve the measures which have been so eminently successful in preventing one of the oldest known diseases. The principal facts connected with the causation and prevention of goiter form an interesting story.

It should, of course, be clearly understood that endemic goiter is but one of several diseases due to disturbance of thyroid function. The condition known as exophthalmic or toxic goiter is due to entirely different causes, has different symptoms and must likewise be treated differently.

CAUSE OF ENDEMIC GOITER.

Many Theories Untenable.—The theories which have been advanced in explanation of the causation of endemic goiter are legion in number. Moreover, many of them are ingenious and even plausible. Unfortunately many of these explanations are the result of unscientific imaginings rather than cool analytic reasoning. Thus, the wide distribution of simple goiter renders improbable contentions which attribute the disease to weather, light, temperature, racial conditions, configuration of soil and similar peculiarities. However, it does seem that endemic goiter is more

frequent on soils deposited from the melting ice of the last glacial epoch.

Iodine Deficiency Theory.—The most probable cause of simple endemic goiter and the one most widely accepted may be stated to be a deficiency of iodine, whereby the thyroid gland is deprived of an element required for its proper and efficient functioning. This theory, evolved from scientific observations extending over a period of years is certainly a sound and acceptable one. The experimental work upon which this contention rests forms a fascinating chapter of medical history.

Frequent Causes of Goiter.—Goiter is particularly associated with those life periods in which the needs of the body for iodine are increased. Thus, during puberty, pregnancy and the menopause the thyroid gland is prone to enlarge. Furthermore, enlargement is also likely to follow infections and intoxications, at which times the demand for iodine is increased. Then, too, the continued use of diets composed largely of fats and proteins likewise increases the need for iodine, while the thyroid gland enlarges in an effort to manufacture, in greater amounts, the substance required. Conditions which interfere with the absorption or utilization of normally available iodine may also cause thyroid enlargement. While the immediate causes of endemic goiter are well understood, the remote or underlying reasons for the disturbance of thyroid equilibrium are as yet obscure.

Goiter a Disease of Contradictions.—Goiter may justly be termed the "disease of contradictions." As soon as one fact connected with the disease seems to

be definitely established, diametrically opposed conclusions, usually based upon what appear to be equally sound scientific premises, are often forthcoming. This peculiarity certainly applies to the causation of the affection, for theories are nearly as numerous as those who write upon the subject. The brilliant research of McCarrison, for instance, appeared to establish conclusively that endemic goiter was due to infection by a living organism, usually transmitted through polluted drinking water. On the other hand it has been found that goiter has increased in certain communities following the introduction of bacteriologically and chemically pure drinking water.

DISTRIBUTION.

Early Goiter Observations.—Since goiter is probably as old as the human race there is ample reason for believing that the disease has been present in America since the days of the first white settlers, if not previously. Among the early writings dealing with the subject may be mentioned the interesting memoirs of Dr. B. S. Barton. This pioneer physician, in a volume published in 1800, presented the results of his observations on goiter among the Indians and settlers on Lake Erie and Ontario. In addition to recording the incidence of the malady as he encountered it, Barton discussed the theories of goiter causation at length and evolved one of his own, which has proved erroneous.

Practically a century elapsed before important additional contributions were made to the subject. In

1895 Dock reported the results of his observations of goiter incidence in several localities in Michigan. He found relatively little goiter in this state, in marked contrast to the heavy incidence reported thirty years later. Munson, in 1895, also noted a relatively slight incidence of goiter among the Indians in twenty-five different localities.

Draft Statistics.—A few years prior to the World War, contributions to the subject began to appear from officers of the U. S. Public Health Service. Thus Clark, in 1913, found simple goiter prevalent in portions of Virginia and West Virginia while Belt made similar observations in 1916 from Oregon. From the early surveys it was apparent that goiter prevailed to a greater extent in some portions of the United States than others, therein simulating conditions in other countries. It was not until the results of the draft examinations had been compiled that the first approximate conception of goiter distribution became available. Among the 2,510, 791 men examined for military service, 11,971 simple goiters were recorded. While some doubt attaches to the accuracy of these observations, because of the varying degrees of skill of the examiners, nevertheless the records constitute a definite contribution to our knowledge of the regional distribution of endemic goiter. Of the men found to have this form of goiter 31 per cent., or more than one-fourth, were rejected because their necks were too large to permit of wearing the military collar.

Geographical Distribution.—The draft records, being compiled for states, cities urban and rural dis-

tricts, as well as racial groups, afford much valuable information concerning the specific distribution of simple goiter. Generally speaking it may be said that these records show simple goiter to be most frequent in the Pacific Northwest, in the Great Lakes Basin and in the valley of the St. Lawrence River. Specifically the affection is most frequent in the states of Idaho, Oregon, Washington, Montana, Utah, and Wyoming. Next in order are Wisconsin, Michigan, North Dakota, and Minnesota. In the Southern states the rates are relatively low when compared with the more densely populated states of Ohio, Pennsylvania and New Jersey.

Goiter and the Sea Coast.—In general, proximity to the ocean appears to favor a low incidence of endemic goiter. This may be due in part to the consumption of foods which are richer in iodine than those obtainable in the interior of the continent. At the same time it must be admitted that modern transportation has so effectively annihilated distance that all kinds of foodstuffs are readily available in the various sections of the country.

Occupation and Racial Status.—When an analysis is made of the draft figures for the purpose of determining the occupations and racial status of the men having endemic goiter some instructive conclusions are reached. Simple goiter was most frequent (13.9 per 1000) among the men coming from sparsely settled districts, having a population of three or less inhabitants per square mile of territory. The disease was next most frequent among men living in

mountainous districts and rarest among those from the agricultural and maritime sections of the country.

Another interesting fact brought out by a study of the draft figures was the liability of men of Finnish and Scandinavian extraction to have simple goiter. However, both of these races are found largely in the Pacific Northwest and around the Great Lakes, where environmental conditions tend to increase the amount of simple goiter. There was almost a complete parity of goiter prevalence between the urban and rural districts, despite wide variations in individual sections of the country.

The information made available by the draft examinations, despite its obvious limitations, has proved very valuable in indicating the general areas of greater and lesser goiter incidence. Obviously it is desirable that a more precise conception of distribution be secured so that underlying causes may be discovered and prophylactic measures applied intelligently. Investigators in many parts of the country have been prompt to meet these requirements. Already many thyroid surveys have been made. The results of these investigations have been compiled and are available for consultation and study.

INDEPENDENT THYROID SURVEYS.

While far from complete and possessing manifest defects, the independent thyroid surveys, confined largely to the children of elementary schools, high schools and colleges, are quite similar in general trend to the goiter findings among drafted men.

After a study of these various surveys, it is evident that wholesale prophylaxis is apparently not required in all states. Furthermore it is evident that areas of considerable incidence exist in localities not previously regarded as being situated in goitrous territory. It has also been determined, following re-surveys, that fluctuations in goiter incidence apparently occur in the same localities following prophylactic endeavors. The principal needs for future surveys are requisite skill in diagnosis, experience and uniformity of methods of examination, whereby comparable results may be assured. A compilation of the results of thyroid surveys made by individual investigators appears in the Public Health Reports issued by the U. S. Public Health Service.

SPECIAL CONSIDERATIONS.

Relation of Endemic Goiter to Age.—While endemic goiter is often spoken of as the goiter of adolescence the malady often appears both before and after, as well as during, this period. In regions of considerable incidence goiter may be readily detected among the younger children, even infants being occasionally affected. Children coming from a non-goitrous to a goitrous region are more prone to develop endemic goiter than are adults under similar circumstances.

Extensive thyroid surveys made in different sections of the United States have revealed much information concerning the time when goiter is most likely to be present among children. It is now certain that the incidence of endemic goiter among girls

increases steadily up to fourteen years of age and thereafter remains fairly constant up to eighteen years of age. Among boys goiter increases until the eleventh year and remains fairly constant until the fourteenth year of age. Thereafter there is a rapid decline in incidence, lessening the need for prophylactic endeavor.

Age and Sex in Relation to Size of Goiter.— Further analyses of the results of thyroid surveys throw additional light upon the relation of age to slight and moderate thyroid enlargements. It has been found that slight enlargement is fairly constant among girls from about ten to seventeen years of age, whereas among boys the rate declines until about the fourteenth year, after which a rapid decline is noted.

Goiters of moderate and marked size among girls increase rapidly in number up to about the twelfth year and continue with a further slight rise, up to the seventeenth year. Among boys, the much lower incidence of moderate and marked thyroid enlargements increases slightly up to the twelfth year and then remains fairly constant.

The predominant type of thyroid enlargement among boys is the slight one, there being a tendency of the thickening to disappear with increasing age. In other words spontaneous recovery is a strong possibility. Among girls, however, endemic goiter usually persists, slight enlargements progressing to moderate or marked involvements.

Simple goiter is not confined to childhood and adolescence. The disease may develop in adults, espe-

cially in females during the child-bearing period. However, uncomplicated endemic goiter rarely develops after the age of forty-five years.

Endemic Goiter and Sex.—That endemic goiter occurs more frequently among females than males is a matter of common knowledge. Especially is this true during these periods of special stress, puberty, pregnancy, lactation, and the menopause. Just why the female is more prone to thyroid disease has not been satisfactorily explained. However, it is conjectured that the demands upon the thyroid of the female are greater, necessitating enlargement in order to meet the unusual requirements. However, this attempted explanation is scarcely a convincing one for the male likewise undergoes a considerable mental and physical readjustment at puberty yet the gland fails to enlarge with the same frequency as among females.

Ratio of Females to Males.—The ratio of thyroid enlargement among males and females is subject to wide variation, according to the degree of incidence in a given locality. Moreover, the proportional incidence of goiter among the children of a given locality may be used as an indicator in estimating the severity of the malady. Thus, in districts in which goiter is most severe in its manifestations, 100 per cent. of both sexes may have thyroid enlargement. From this unusual peak the condition gradually decreases in severity until the proportion may become 10 to 1 in districts with sporadic occurrence of endemic goiter. In the Great Lakes Basin simple goiter is approximately twice as frequent among girls as

boys, the enlargements among the latter being principally of slight degree. In Connecticut, where goiter is relatively infrequent, the ratio is 4.2 to 1.

Goiter and Color.—Many writers state that endemic goiter is less frequent among colored than among white children. Some assert that the colored race enjoys a relative immunity. These experiences differ radically from the findings of the Public Health Service which has repeatedly shown a greater incidence of simple goiter among colored children.

Goiter and Race.—While the claim is frequently made that the members of certain races are relatively free from goiter because of peculiar customs or diets there is no reliable evidence to support this contention. Persons living in a similar environment, regardless of their antecedents, appear to have an equal opportunity of acquiring simple goiters.

Effects of Endemic Goiter.—While other phases of the endemic goiter problem are well understood the effects of this disease are largely within the realm of uncertainty. Although it is known that physical and mental degeneration, such as cretinism, mutism and idiocy occur in countries having pronounced goiter endemicity, the exact sequellæ of the malady in the United States are not known. Statements are rife in public health bulletins published in this country concerning the ill effects of endemic goiter upon mentality, physical growth and general well-being of the affected individuals. So far as endemic goiter is concerned it is exceedingly difficult to prove, by actual observations and measurements, that these statements are true. If ill effects are exerted it is

probable that one of the more severe forms of goiter is present. Nevertheless endemic goiter should be regarded as a potentially dangerous affection even when there are no positive indications of deleterious effects.

Difficulties in Determining Effects.—It is not an easy matter to prove that certain symptoms are due to thyroid disease for there are numerous factors which must be considered simultaneously. For instance, it might be concluded, following an investigation, that physical growth is retarded in the presence of simple goiter. However, before asserting that goiter is solely responsible for such retardation other factors, among which may be mentioned malnutrition, overexertion, cretinism, inbreeding, lack of sunshine and racial peculiarities, must receive consideration.

Studies of Effects.—A number of studies have been made by the Public Health Service for the purpose of learning the relationship between endemic goiter and intelligence, endemic goiter and physical growth and endemic goiter and school attendance. Closely associated with these subjects has been an attempt at determining the possible relationship between goiter and such potential foci of infection as may be present in decayed teeth and diseased tonsils. The results of these studies have been largely of a negative character. Nevertheless it is desirable that further efforts be made to discover the exact effects of simple goiter, especially the comparatively mild type found in the United States, upon the human economy.

PROPHYLACTIC METHODS.

Inasmuch as a deficiency of iodine is thought to be the principal underlying cause of simple endemic goiter, it is but natural that this same element should be employed in correcting the malcondition. However, an enormous amount of experimental work was required in order to determine the most effective method of meeting this deficiency. Marine and Lenhart first used iodine in this way on a large scale in 1910, when they were called upon to suggest measures for relieving the brook trout in the hatcheries of Pennsylvania of endemic goiter.

Goiter Among Lower Animals.—Endemic goiter is found among the lower animals as well as in the human kind. In fact much of the helpful knowledge now possessed was obtained by observing the disease as it existed in animals, birds, and fish. Thus the affection has been noted in mules, oxen, horses, dogs, cats, goats, pigs, sheep, white rats and white mice as well as fowls and pigeons. Among artificially bred fish, especially brook trout, the disease has at times assumed disastrous proportions. The success which now attends the application of prophylactic measures among children resulted from the successful efforts to prevent and cure simple goiter among the lower animals. The addition of traces of iodine to the food and water of animals has marked a turning point for the better in the stock raising industries.

Periods for Prophylaxis.—The methods suggested for conveying iodine to those in need of this essential element are numerous and diverse. The two principal

periods during which iodine prophylaxis is especially indicated are pregnancy and adolescence. The giving of iodine to the prospective mother safeguards the thyroid glands both of the mother and fetus. However, the pregnant woman need not necessarily reside in a goitrous territory in order to secure the maximum benefit accruing from the use of iodine. Marine contends that every prospective mother is benefited by the judicious use of iodine. The further application of a similar preventive measure to girls between the ages of ten and sixteen suffices to provide further insurance against the disease. When these crucial periods are efficiently covered under competent medical guidance, there is justifiable expectation that the recipients of the iodine will escape simple enlargement of the thyroid with its aggravations and complications.

Oral Prophylaxis Preferable.—While results may be obtained by the inhalation of iodine fumes and the absorption of iodine through the skin the most practicable as well as the most simple and efficient method is that of administering the element by mouth. However, opinions differ considerably as to whether individual oral prophylaxis or general prophylaxis is the better procedure. It is obvious that efforts to control the incidence of simple goiter by the giving of iodine to individuals can only reach a limited portion of the population. On the other hand, there appear to be definite objections to widespread distribution such as may be attained through the iodization of municipal water supplies or the general use of iodized table salt. In the discussion

which follows the merits and drawbacks of each of the principal methods will be presented.

Individual Oral Prophylaxis.—It has already been suggested that individualization, in so far as goiter prevention is concerned, can reach but a limited number of persons. Nevertheless, this measure has much to be said in its favor, for it insures nominal observation, proper dosage of iodine and freedom from disagreeable complications. Moreover, under this plan persons not in need of iodine and those who may be harmed by its ingestion, are less liable to receive it. When goiter prophylaxis is intelligently carried out there appears to be little danger of untoward happenings. It should be clearly understood, when iodine prophylaxis is under consideration, that the procedure aims only to preserve the equilibrium of the normal thyroid gland. *The reduction of existing enlargements is an entirely different matter, requiring the diagnostic as well as the therapeutic skill of the competent physician, preferably one who has made a special study of the subject.*[1]

Essentials of Prophylaxis.—The requirements of an iodine-containing prophylactic are efficiency, harmlessness, palatability, minute but adequate dosage, low cost and readiness of administration. That these requirements are not unreasonable is evidenced by a consideration of the several factors involved. First of all the prophylactic must be efficient, actually preventing enlargement of the thyroid gland. Apparently it matters very little which form of iodine is

[1] Italics are mine—Israel Bram.

used for goiter prevention, as success invariably follows the use of the element. From the practical viewpoint, however, it is more convenient and practical to use some forms of iodine than others.

Harmlessness Essential.—A prophylactic must be harmless as well as efficient, for it would not do to substitute for a potentially quiescent condition a new and more serious disease entity. If the material used has an objectionable color, odor or taste success cannot be expected to accompany prophylactic efforts. Children particularly are quick to note defects of this character. Parents too are prone to oppose the use of substances which are responsible for even slight inconvenience in their offspring. Consequently it is essential that palatable preparations of iodine be used for prophylactic purposes.

Iodine a Potential Poison.—Much of the disrepute into which iodine has fallen in certain quarters has been occasioned not by any inherent defect in the element itself but rather through failure to appreciate its potentialities for harm when improperly used. Iodine is, of course, a potential poison and to be regarded with wholesome respect, especially by the uninitiated. Administered in suitably minute doses under competent supervision iodine will serve efficiently as a preventive of simple goiter. When used injudiciously, that is in too large doses, or over too long periods, iodine is quite liable to damage the human economy.

Individual Versus General Prophylaxis.—The manner in which the prophylactic is used is another point of importance. The more automatically the remedy

is made available the more certain it is to be used. Thus, iodized table salt or iodized drinking water insure a more far reaching and certain distribution of iodine than can be attained through individual prophylaxis. Likewise the regular administration of iodine to children by responsible physicians is more likely to succeed than when each person is left to his own devices. Therefore, it is obvious that regular and periodical administration of iodine in proper doses is essential to success in safeguarding the thyroid.

Goiter Prevention in the General Health Program.—The economic side of the goiter prevention, while seldom stressed, has its important aspects. It must be realized that the prevention of goiter is only one of the many pressing public health projects and is, therefore, entitled only to a proportionate share of the available funds. A method which will be both efficient and automatic, while at the same time inflicting but a relatively slight financial burden, is obviously the procedure of choice.

Individual Prophylaxis.—Individual oral prophylaxis is the measure preferred by many sanitarians because of the opportunity for accurate dosage and control of those receiving the remedy. The first demonstration of this method was afforded by the successful prophylactic endeavors of Marine and Kimball among the school girls of Akron, Ohio. These pioneers, by administering a solution of sodium iodide semi-annually prevented thyroid enlargement among normal girls and either reduced or held in abeyance existing enlargements. Since that time

numerous preparations of iodine have been proposed for individual prophylaxis. Prominent among these is the combination of minute doses of an organic iodide with chocolate. Because of its palatability, assimilability and convenient form this tablet has achieved a considerable vogue in some parts of the United States. For prophylactic purposes one of these tablets is customarily taken each week during the school year.

Kelp and Other Preparations.—Another promising preparation is the chocolate coated tablet of dried kelp, or iodine-containing sea weed, of which one tablet is taken weekly for preventive purposes. In addition to the combinations already mentioned many physicians have their own favorite iodine preparations for goiter prevention. Provided the fundamental precautions are observed in their application such preparations will undoubtedly prove efficacious.

Methods of General Prophylaxis.—The chief argument against individual oral prophylaxis is its limited applicability. It is manifestly impracticable to administer separate weekly doses or semi-annual courses of iodine to all persons in need of this protection. Therefore, several ingenious methods have been devised with the idea of providing a widespread and automatic distribution of iodine where it is most needed. Among such measures may be mentioned the iodization of public water supplies. So far this procedure has been used to a very limited extent in the United States and reports as to its efficiency are almost entirely lacking. The method has failed to achieve any considerable popularity and may be con-

sidered as requiring further appraisal before a final verdict as to its efficiency can be given.

Artificially Iodized Foods.—The addition of iodine to commonly used foods is a procedure of obvious merit, provided efficiency in goiter prevention and absence of harmful effects are concomitant. During the past few years the manufacturers of various commodities have been seized with the desire to iodize their food products. Thus, makers of gelatine, ginger ale, distilled water, beef extracts and biscuits have been among those who have felt impelled to add iodine to their products for the purpose of aiding in goiter prevention. Of course, if such wholesale iodization of food products were encouraged, too great an amount of iodine would become available. Consequently harm would be inflicted upon a considerable number of susceptible individuals.

Iodized Table Salt.—The iodization of common table salt, which next to water is the most commonly used article of food, appears to offer splendid possibilities in preventing simple goiter. It must not be supposed that the use of iodized salt is free from objections. By some this commodity is regarded as a distinct menace to the well-being of those who are usually affected detrimentally by iodine. The foes of the measure term its use "the indiscriminate and promiscuous distribution of iodine," probably overlooking the infinitesimal amounts of iodine present. Already a number of reports have appeared in the medical literature, detailing alleged detrimental effects following the ingestion of iodized table salt. In order to meet these objections, which are to a

large extent dubious, the iodine in artificially iodized salt has been so greatly reduced as no longer to be capable of harm, even to the preeminently susceptible. So eminent an authority as Marine insists that iodized salt is a practical prophylactic, incapable of inflicting harm and unquestionably efficient. At the present time it appears that iodized salt is the most promising of the general prophylactics and with its reduced iodine content, may be used by all persons with impunity. Iodization of other food products should certainly be opposed. Supplementing the use of iodized salt it may be judged expedient by medical attendants, in regions of considerable goiter prevalence, to institute individual oral prophylaxis.

Limitations of Iodized Salt.—In some quarters there is an impression that iodized salt will reduce existing thyroid enlargements. This is undoubtedly a mistaken idea. In all probability iodized salt, which is intended solely for the maintenance of normal thyroid equilibrium, exerts not the least influence upon such existing enlargements. Whatever may be the favorable opinions regarding the efficiency of iodized table salt it is obvious that its use should be confined to areas of marked goiter incidence. The entire country does not require this prophylactic.

Prevention During Pregnancy.—Preventive measures applied during pregnancy are based upon sound scientific principles. For instance, Marine has shown that when a very minute quantity of iodine is given to pregnant dogs and cats from which most of the thyroid gland has been removed, the young at birth will have normal thyroids. He has also been able

to obtain from the same animals successive litters of goitrous and non-goitrous young simply by withholding or administering iodine. It has likewise been demonstrated that the administration of iodine to the human kind will prevent enlargement of the thyroid glands of the mother and fetus. Moreover, the child will usually be born without evidences of thyroid enlargement. This procedure assumes obvious importance when it is recalled that a potentially dangerous goiter differing from the simple form, is particularly prone to occur in male children. Furthermore, this form of goiter, while not frequent often becomes the seat of hyperthyroidism and malignant degeneration later in life.

This method of preventing goiter is exceedingly simple and is carried out during the first half of pregnancy under the direction of the family physician. There are few contraindications to the institution of the procedure and these will readily be recognized by the competent medical attendant.

Goiter as a Nutritional Problem.—As additional studies have been made concerning the prevalence and prevention of goiter there are important indications that simple thyroid enlargement may be largely a matter of faulty nutrition. Determinations of the amounts of iodine in commonly used foodstuffs have revealed much information of interest and value. Thus, marine fishes, mollusks and crustaceans contain higher percentages of iodine than any other common foods. In order of decreasing amounts of iodine the more common foodstuffs are divided into the following groups:

1. Marine algæ, containing the greatest amounts of iodine.
2. Oysters, clams and lobsters.
3. Shrimp.
4. Crabs and most ocean fishes.
5. Fresh water fishes, vegetables, beefsteak, milk, etc.

If an iodine-deficient diet could be supplemented by foods containing iodine in natural combination it is quite probable that thyroid enlargement would become less prevalent. Undoubtedly the lesser incidence of goiter along the sea coast is due in part to the consumption of iodine-containing foods.

Is Goiter Increasing?—As additional thyroid surveys reveal the extent and distribution of endemic goiter the question is frequently asked, "Is endemic goiter increasing in the United States?" Inasmuch as statistics concerning goiter incidence are still incomplete, it is impossible to make comparisons which will throw light upon this important subject. The knowledge that simple goiter is preventable and often curable has greatly increased the interest in the subject during the past few years. Consequently, many surveys have been made and reports issued. Coincidentally many physicians, health officers and others have undertaken special studies of goiter. In fact there are few subjects which have attracted so widespread attention and resulted in so voluminous a literature. It appears, therefore, that the disease may actually be more frequent. However, in the absence of information detailing goiter incidence twenty-five or fifty years ago it may be assumed that the in-

crease is apparent rather than real. In this connection it is conceivable that an actual increase may follow the use of foods from which iodine has either been removed by refining or through the depletion of natural iodine in food and water. Moreover, failure to institute iodine prophylaxis may likewise permit a definite increase in the incidence of this disease.

Conclusion.—Marine has well said that of all known diseases simple goiter is the most easily prevented. Whether one is inclined to favor the use of far reaching prophylaxis, as for instance, through the medium of iodized table salt, or the institution of the more limited individualized precautions against endemic goiter, the efficiency of the method itself cannot be questioned. The continued success and popularity of the measure will depend largely upon its intelligent application. Of paramount importance in this connection is the use of iodine in such quantities as will prevent thyroid enlargement and, at the same time, obviate harm to the susceptible individuals who incidentally receive the element.

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CHAPTER IX.

PREVENTION OF GOITER.[1]

The prevention of goiter must include a consideration of the prevention of endemic goiter, cretinism, sporadic goiter, simple thyroid tumors (adenoma and cysts), and the prevention of thyroid malignant disease (carcinoma and sarcoma).

PREVENTION OF ENDEMIC SIMPLE GOITER.

The avoidance of goiter occurring in goiter districts or belts in the United States has been discussed by Dr. Olesen in the preceding chapter. He points out that endemic goiter in this country is quite preventable by iodine given in minute doses under proper guidance. This indicates that the malady is largely due to a relative deficiency of iodine in the food, air or water, a view amply confirmed by competent observers throughout the country.

The addition of iodine to the air by placing in the room an open, wide-mouthed bottle containing iodine crystals has been suggested by some observers. Iodized salt is likewise popular. The addition of iodine to the water supply of large communities as has already been done in Rochester, New York, and Sault Ste. Marie, Michigan, is still a topic for consideration of health authorities in many parts of the

[1] The prevention of exophthalmic goiter or Graves's disease is discussed in a later chapter.

world. Another popular form of administering iodine is in chocolate tablets which are manufactured by many drug houses.

Instead of iodine, the taking of foods rich in iodine content is advocated by many as an effective weapon against endemic goiter. Jarvis, Clough and Clark[1] urge the use of sea foods, especially salmon. Butter, codliver oil and sardines are also rich in iodine. Since kelp is high in iodine content, Turrentine[2] among others, strongly advises its use in goiter districts.

PREVENTION OF CRETINISM.

Cretinism is most apt to occur in families in which there is a strong tendency toward simple goiter. Because of this fact, the physician who is consulted usually prescribes appropriately small doses of iodine to the pregnant mother should she reside in a district where goiter is very prevalent. It has been found that small doses of sheep's thyroid gland given to the mother are even more efficient. It is well tolerated during pregnancy and not only safeguards against cretinism and simple goiter in the newborn infant, but the mother is also protected to a great extent against goiter incident to pregnancy and against kidney and other complications. I must strongly emphasize the importance of close medical supervision when thyroid extract is taken.

If, however, preventive measures had not been in-

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[1] N. D. Jarvis, R. W. Clough and E. D. Clark: Jour. Amer. Med. Assoc., 1926, *86*, 1339.

[2] J. W. Turrentine: Nation's Health, 1924, *6*, 7.

stituted, and a newborn infant appears to have evidences of cretinism, its future can be safeguarded by the same remedy advised for the mother, namely, thyroid extract of the sheep administered by a specialist. Neglect to do this at once may mean disaster for the child since the stunting of mental and physical development begins within the first year of life.

PREVENTION OF SPORADIC SIMPLE GOITER.

The prevention of goiter occurring away from endemic goiter districts may likewise be successfully carried out by minute doses of iodine as suggested in the prevention of endemic goiter. Here, however, the problem is somewhat more complicated, since strong hereditary influences, improperly balanced diet, infections in tonsils and teeth, physiological demands made upon the thyroid gland through changes incident to puberty, adolescence, and pregnancy, as well as undue physical and mental stress and strain of education or of wage-earning or recreation, each and all, serving as causes, may or may not be offset by the administration of iodine.

Since heredity plays an important part in goiter formation, ideal prevention of goiter should begin before birth of the individual. The pregnant mother who is susceptible to or presents evidences of thyroid enlargement must receive adequate attention regarding ductless gland equilibrium of self and unborn child. The physician in charge, if consulted early, will give the necessary instructions with or without the use of iodine or of thyroid extract.

When the child approaches school age, care must be taken to discourage the use of flesh food, or at least to advise its reduction to a minimum, and to prohibit the use of tea, coffee, spices and the condiments. Physical and mental hygiene must approach the ideal with a view to the prevention of undue stress and strain upon the thyroid gland.

Since the thyroid gland in the adolescent girl is a rather unstable organ, the insistence upon absolute quiet and rest in bed during the first day or two of each menstrual period will assist greatly in the prevention of goiter.

However valuable iodine may be in *prevention* of goiter, one thing is certain, it is a doubtful remedy in the *cure* of an already existing lump on the neck. Treated by iodine, goiter is apt to become larger and may even become poisonous or toxic. We must, therefore, bear in mind that *prevention* and *cure* are terms which are not interchangeable.

In the presence of known susceptibility to goiter, what, then, should be done to prevent its occurrence? If you are residing in a goiter belt, your physician will give you the routine prophylaxis and you will be safe. If you are residing away from a goiter belt, the better plan is to submit yourself to a careful quizzing and physical examination by your physician. He may prescribe iodine or he may suggest an adjustment of your mode of living, including eating, working, playing, or resting, in addition to which he may suggest the correction of discoverable infections in intestines, teeth, tonsils, or elsewhere. If the doctor finds no cause for goiter, and your habits

of life are irreproachable, he may, in the presence of inherited susceptibility, prescribe a minute dose of thyroid extract at intervals. Since sporadic enlargement of the thyroid gland is due to the need of the body for more thyroid secretion, this procedure is the best known method for the prevention of goiter of this type.

What has been said above applies to the prevention of simple thyroid swellings which are apt to occur in children, adolescents and young adults.

THE PREVENTION OF SIMPLE THYROID TUMORS. (SIMPLE ADENOMA OR CYST.)

When, however, a small swelling of the thyroid gland has actually occurred and is improperly treated or altogether neglected, certain changes may occur within its substance which, in the course of a few years, completely alter the anatomy of the mass. These changes are usually known as adenomatous infiltration or as cyst formation as the case may be, amounting to actual tumors. As already stated, in practically all advanced goiters in which operation appears to be the only means of cure, there was a time when prevention or cure by non-operative means was possible. The individual having permitted valuable time to pass, Nature has continued to err, and now the problem is one of surgical intervention. How, then, can we prevent the occurrence of simple goiter tumors just discussed? By adequate preventive measures prior to the onset of goiter, or by expertly applied curative measures during the time

when goiter first asserts itself, that is, at least within the first year or two of its appearance.

If the diagnosis in a case of old-standing goiter is definitely that of adenoma or cyst, the time for prevention or for non-operative treatment has passed. Surgical removal is the only recourse and will safeguard the individual against the occurrence of poisonous symptoms and the possibility of malignant changes.

PREVENTION OF MALIGNANT GOITER.

Approximately one per cent. of adenomatous or cystic goiters undergoes changes developing into cancer. Such an unfortunate change within a goiter does not occur in those thyroid swellings seen in children and young adults. Also, cancer of the thyroid is never observed in the hyperplastic thyroid of exophthalmic goiter.

Cancerous changes occur only in those goiters that have been definitely of tumorous nature for years. The prevention of this condition is obvious. If goiter has existed for several years and is clearly diagnosed by an expert to be of tumor nature, no matter how harmless or simple the tumor, it is well to have it promptly removed. Were this advice uniformly heeded cancer of the thyroid gland would be practically unknown.

CHAPTER X.

IODINE VERSUS GOITER: FACTS AND FALLACIES.

Iodine in connection with the prevention and treatment of goiter is so widely discussed and so little understood that I believe an entire chapter devoted to this subject will accomplish a great deal in the discrimination between fact and fallacy. There is so much good to be accomplished with iodine in the *prevention* of goiter, and yet so much harm is being wrought by undue publicity and indiscriminate drugging with this substance in the *treatment* of goiter that iodine versus goiter has become one of our foremost health problems.

CONTRADICTORY VIEWS ON CAUSATION.

The theory that certain kinds of water are the cause of endemic goiter is the oldest. Not only were the Chinese, 2000 years B. C., of this belief, but ancient Greece and Rome likewise looked to the water as the cause of goiter. Crotti[1] quotes Lombroso who states that a "goiter fountain" was visited by youths at the time of conscription in order to acquire goiter quickly for the purpose of avoiding military service.

While most of those who believe water to be responsible for endemic goiter causation feel confident

[1] A. Crotti: Thyroid and Thymus, Lea & Febiger.

that the precise cause is lack of iodine in the water, other observers, equally competent, do not concur with this view. Berry[1] feels that in the great majority of endemic goiter districts the cause is not iodine deficiency but the presence in the drinking water of mineral matter of a calcareous nature in fine subdivision. Wegelin,[2] of Switzerland, believes that if iodine is an important factor, it is not enough to account for the many varieties of goiter encountered. In further support of his views, this observer points out that wild animals, notably wild rats from the Canton of Berne (a confirmed goiter belt), never present goiter, while the white rats of the laboratories of Berne have enormous goiters. Wegelin further states that McCarrison made the same observations in India. After several years' research, a Goiter Commission of Utrecht, Holland, concluded, in May, 1924, that there must be some local and unknown factor other than water to explain the incidence of endemic goiter in their midst. Still other investigators believe that germs in the water, rather than lack of iodine, are responsible for endemic goiter formation. These germs have been demonstrated not only in the drinking water, but also in the goiter itself. Cantero[3] and Crotti[4] have demonstrated the

[1] J. Berry: Clinical Aspects of Simple Goiter, Lancet (London), 1926, *1*, 269.

[2] C. Wegelin: Internat. Clin. (Phila.), 1926 (Series 36), *4*, 38.

[3] A. Cantero: Surgery, Gynecology and Obstetrics (Chicago), 1926, *42*, 61.

[4] A. Crotti: Ann. Meeting Amer. Assoc. Study of Goiter, Phila., Feb. 3, 1927.

causative germ in both the drinking water and in the goiter of afflicted patients.

VIEW OF THE MAJORITY.

On the other hand, lack of iodine as the cause of goiter is a view that has been held for many centuries. Over four thousand years ago the Chinese used burnt sponge in the prevention of goiter, and the ancient Greeks likewise employed this remedy in an effort to overcome "big neck." Many names could be mentioned in this relation up to the time of Coindet[1] who, in 1820, pointed out the virtues of iodine in the management of thyroid enlargements. In 1856 Chatin,[2] a Frenchman, was the first to conclude that lack of iodine has something to do with goiter formation. Von Fellenberg's[3] studies on the relative iodine content of foods, beverages, soil and air, and McClendon and Hathaway's[4] discovery that foods and water in goiter regions contain less iodine than foods elsewhere, have materially assisted in the solution of this problem. The researches of Marine and Kimball [5] [6] mark the most important step to prevent goiter in this country on a large scale. Their work attracted the attention of others throughout the

[1] Dumas and Coindet: Communiqué 5 la soc. helv. des sc. Nat. dans sa Séance du 25 juillet, 1820.

[2] A. Chatin: Compt. rend. Acad. d. Sc., 1850.

[3] T. von Fellenberg: Biochem. Ztschr., 1923, *139*, 371.

[4] J. F. McClendon and J. C. Hathaway: Jour. Amer. Med. Assoc., 1924, *82*, 1668.

[5] D. Marine and O. P. Kimball: Arch. Int. Med., 1918, *22*, 41.

[6] D. Marine and O. P. Kimball: Jour. Amer. Med. Assoc., 1921, *77*, 1068.

world, eminently in those countries about the Alps Mountains. Thus Hunziker,[1] Klinger,[2] and others of Switzerland appear to have proved that iodine in small quantities will prevent endemic goiter formation.

IODINE IN THE THYROID GLAND.

It was pointed out in Chapter I that iodine is an essential ingredient of the normally functioning thyroid gland, and when the iodine content of this organ falls below 0.1 per cent., goiter is apt to develop. Upon this fact is based the claim that in the prevention of goiter the administration of iodine yields success. That this is true in endemic goiter districts appears to be unquestionable. We must insist, however, that there are *many* causes for the reduction of iodine in the thyroid gland, and that a deficiency of iodine in the water supply, as is the case in goiter belts, is merely *one* of them.

Infections, adolescence, pregnancy, heredity, unhygienic conditions, each and all may give rise to a deficiency of iodine in the thyroid gland. Merely to supply more iodine to these individuals is, however, like giving a headache powder without an investigation of the cause of the headache. Iodine deficiency in the thyroid gland, like headache, is a symptom of varied causes, and its cure depends upon the discovery and elimination of individual cause. If, in a given locality of the world in which many persons are suffering with goiter, it is discovered that there

[1] H. Hunziker: Cor. f. Schweitz. aerzte, 1918, *48*, 247.
[2] R. Klinger: Schweiz. Med. Wchnschr., 1921, *15*, 12.

is a lack of iodine in the water, the assumption of a causal relationship between lack of iodine and goiter seems reasonable. If elsewhere the water has enough iodine, as is proved in regions away from goiter belts, the cause of goiter (lack of iodine in the thyroid gland) is not lack of iodine intake, but something else. It is our duty to discover what that something is and to eliminate it. The administration of iodine without investigation is a dangerous procedure. We must bear in mind that even in goiter belts there are goiters of sporadic causation not due to deficiency of iodine intake.

McCARRISON'S VIEWS.

In a valued personal communication (April 6, 1927), Dr. McCarrison[1] presents his views in regard to iodine and goiter as follows:

"(1) There are at least four types of 'simple goitre': physiological goitre; parenchymatous, adeno-parenchymatous or chronic hypertrophic goitre (the classical type of endemic goitre of mountainous regions); diffuse colloid goitre (the endemic goitre of the plains and low altitudes); and lymph-adenoid goitre. All differ in their relation to iodine.

"(2) A sufficient supply of iodine is essential to the normal turnover of the thyroid gland's cycle of activity. The more work the gland has to do the more iodine, *within limits,* it needs.

"(3) Conditions which call for undue work on the part of the thyroid, demanding its pathological enlargement or hypertrophy, are: improperly balanced foods (especially those ex-

[1] Lieut.-Colonel Robert McCarrison, C.I.E., I.M.S., Director, Deficiency Diseases Inquiry, Pasteur Institute, Coonoor, South India, is one of the most eminent authorities on the subject of endemic goiter, his researches for the British Government in India being of utmost value.

cessively rich in fats, proteins or lime) and insanitary conditions of life (social and personal; and, intrinsic as well as extrinsic to the individual). An increased intake of iodine proportionate to these conditions is required to prevent thyroid hypertrophy.

"(4) The parenchymatous or chronic hypertrophic type of endemic goitre is a true hypertrophy; therefore, the complete cycle of the thyroid gland's activity is taking place, active secretion predominating; and enough iodine is reaching the gland to enable this cycle to take place. But the revolution of the gland's cycle of activity is rapid and its output of products is increased to meet the demands occasioned by the conditions mentioned in paragraph 3; therefore, the gland needs *more* iodine for oxidation processes than would be required were these conditions not present: there is, in short, a deficiency of iodine relative to these conditions of life which are the essential cause of goitre. The rational prophylaxis of this type of goitre is to remove the unhygienic conditions of life, to provide pure water supplies and to make social and personal hygiene perfect. And finally, to administer iodine where necessary in minute amounts and only under skilled supervision. The latter is an imperative condition of its use for these reasons:

(*a*) The excessive ingestion of iodine by the possessors of wholly normal glands may cause the organ to increase in size by as much as 50 per cent. due to undue distension of the vesicles with iodine-rich colloid. At the same time the gland is unduly stimulated. The same will probably apply to 'physiological goitres,' which are due purely to physiological causes, may be *normal* to the individual, and occur in endemic and non-endemic localities alike.

(*b*) Once a work-hypertrophy has caused overstrain, a strain-fibrosis results cutting off areas of secretory epithelium forming adenomata. The administration of iodine to such cases may cause the adenomata to take an undue activity with resultant thyrotoxicosis. Iodine

prophylaxis is, therefore, contra-indicated in cases of chronic hypertrophic goitre in which adenomata are present and to which the term 'adeno-parenchymatous goitre' is properly applicable.

(*c*) Iodine can only be suitably given as a prophylactic agent—in areas where this classical type of goitre is endemic—to those whose thyroids are still normal or in whom the goitrous process has not yet proceeded to fibrosis—a very difficult matter to decide. Even then it must be given with care under skilled medical supervision and in minute doses. The best way to give it is in natural foods containing it.

"(5) If any goitre be due to absence of iodine or its insufficient ingestion or assimilation (that is to say, *too little iodine reaching the thyroid* to enable the *normal* turnover of the gland's cycle of activity to take place) then it can only be the diffuse colloid goitre. In this the cycle is interrupted at the stage of colloid storage and active secretion is in abeyance. Assuming that this type of goitre is due to this cause, which is as yet unproven, then iodine prophylaxis under proper supervision may do good.

"(6) I have recently produced in young rats a type of goitre to which I have applied the term lymph-adenoid (introduced by Williamson and Pearce, 1925). It is probably wide-spread amongst Western peoples. It is unrelated in its origin to iodine. An account of it will, I hope, appear shortly in the Lancet (London) and in the July number of the Indian Journal of Medical Research.[1]

"(7) Combinations of these various types of goitre may occur, or all types may be present in the same locality: That is to say, some that may be harmed by iodine, some that may be

[1] These articles appeared as follows:

(*a*) Robert McCarrison: Experimental Production of a New Type of Goiter Unrelated in its Origin to Iodine, Lancet (London), 1927, *1*, 916–920.

(*b*) Relation of Endemic Goiter to Iodine Content of Soil and Water, Indian Jour. Med. Research, 1927, *15*, 207–246.

benefitted by it, and some that will not be influenced one way or the other. It is, therefore, obvious how unscientific the generalized prophylactic use of iodine is, unless the various types of goitre in the given locality be differentiated and their relation to iodine understood. Such differentiation may be difficult or impossible; hence the risk of iodine.

"(8) The only rational prophylaxis of 'goitre' is, in my view, attention to the fundamental principles of nutrition and of personal and social hygiene, the provision of pure water-supplies, the provision of well-balanced food containing iodine in its natural form, and the administration of iodine in selected cases under *skilled* medical supervision."

The last two paragraphs of Dr. McCarrison's remarks are especially valuable in the clarification of the relationship of iodine to goiter.

THE DANGER OF OVER-ENTHUSIASM.

Great harm has resulted from the use of iodine as an alleged *cure* for goiter. In my own practice a new kind of goiter has made its appearance: the goiter resulting from the indiscriminate taking of iodine. And many of these goiters endanger the very life of the patient.

In 1922 my article[1] in International Clinics appeared as a protest against indiscriminate iodine administration. Several hundred patients harmed by this drug had already come to my personal attention. Since the above date, I have frequently repeated my warnings against the undue enthusiasm exercised in the use of iodine in the treatment of

[1] I. Bram: International Clinics (Phila.), 1922, *2* (Series *32*), 108.

goiter; not only in my larger book[1] but in other articles[2 3 4 5] in medical journals. Among recent articles by other observers confirming my views are those of Roth,[6 7] Bircher,[8 9] Tobler,[10] Veissmann,[11] Weisel,[12] Kimball[13] and McClure.[14]

Jackson[15] reports 38 cases of iodine hyperthyroidism as having occurred in his clinic in two years. At least two of these died directly as the result of iodine ingestion. He points out that these cases of iodine hyperthyroidism are far more serious than the hyperthyroidism seen in ordinary practice, and rightly insists that iodine has little place in the *treatment* of goiter in general.

Wegelin[16] of Berne observes that at the surgical clinic of Basel there is a great increase in iodine

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[1] I. Bram: Goiter, Non-surgical Types and Treatment, p. 82, The MacMillan Co., New York.

[2] I. Bram: Therapeutic Gazette (Detroit), 1924, *40* (May), No. 5.

[3] I. Bram: Chicago Medical Recorder, July, 1925.

[4] I. Bram: Endocrinology, 1926, *10*, 181.

[5] I. Bram: Med. Jour. and Record (N. Y.), 1926, *123*, 746.

[6] O. Roth: Schweiz. Med. Wchnschr. (Basel), 1924, *54*, 742.

[7] O. Roth: Deutsches Archiv. für klinische Med. (Leipzig), 1924, *144*, 177.

[8] E. Bircher: Zentralblatt für Chirurgie (Leipzig), 1924, *51*, 2427.

[9] E. Bircher: Klinische Wochenschrift (Berlin), 1925, *4*, 729.

[10] T. Tobler: Mitt. a. d. Grenzgeb. d. Med. u. Chir. (Jena), 1924, *37*, 622.

[11] A. Veissmann: Munchener Med. Wchnschr. (Munich), 1925, *72*, 131.

[12] J. Weisel: Med. Klin. (Berlin), 1925, *21*, 1445.

[13] O. P. Kimball: Jour. Amer. Med. Assoc., 1925, *85*, 1709.

[14] R. D. McClure: Jour. Amer. Med. Assoc., 1925, *88*, 595, (Abst. Disc.).

[15] A. S. Jackson: Amer. Jour. Med. Sci., 1925, *170*, 271.

[16] C. Wegelin: Internat. Clin. (Phila.), 1926, (Series 36), *4*, 38.

hyperthyroidism as the result of the use of iodine in that section of the world.

Sajous[1] (who has always been opposed to iodine treatment of goiter), aptly states the case as follows: "At best iodine can be tried only when the basal metabolism and pulse are normal and when tachycardia, tremor, and eye symptoms are absent. Under any circumstance it is a double-edged sword with its sharpest edge menacingly turned toward the patient at every turn."

In an editorial in the American Medical Association,[2] a warning against over-enthusiasm in the use of iodine is stated in a tactful yet certain manner: "The persons affected with thyroid disturbances have been aroused to the possibilities of relief that modern medicine offers; the public has been awakened to the problem that confronts many of our communities, and the medical profession has been stirred to a realization of its duties to the public in demanding the institution of safe relief measures. * * * With public interest and professional concern at length widely aroused, it becomes highly important that the aims desired in goiter prevention shall not be marred by errors of judgment or by procedures that still lack the essential support of dependable scientific tests. The enthusiasm for relief measures must not be allowed to initiate the public into unwise or unwarranted practices. * * * The various proposed regulations to secure adequacy of iodine supply also need

[1] Chas. E. de M. Sajous: Jour. Amer. Med. Assoc., 1924, *83*, 1527.

[2] Editorial, Journal American Medical Association, 1926, *83*, 1849-1850.

to be seriously considered and perhaps await further experience before legislation of an all inclusive character is supported. * * * Olesen has already warned us that iodized table salt should not be regarded as a 'cure-all.' It will probably not cure a simple goiter, especially one of appreciable size."

Hartsock[1] of the Cleveland Clinic, in a recent protest against the use of iodine in goiter, states that in a period of six months, between 25 and 50 per cent. of all cases of hyperthyroidism in which operation was necessary iodized salt was directly or indirectly responsible for the patient's plight. This writer justly remarks: "Without any precaution being given for its use, this salt is being vigorously promoted by the combined propaganda of health officials and of salt companies, who, through agency of newspaper articles, civic meetings, and attractive advertising, have gradually created the impression in the lay mind that iodine is a panacea for all goiter conditions and will ultimately solve the goiter problem."[2]

HOW IODINE HARMS IN GOITER.

This drug produces its harm in goiter patients in two ways. First, by virtue of the fact that iodine is a poison. Since the thyroid gland is busily engaged in combatting an already sufficient quantity of poison within the body, the addition of another in the form of iodine results in overwork of the organ with a

[1] C. L. Hartsock: Jour. Amer. Med. Assoc., 1926, *18*, 1334.

[2] This is no argument against the use of iodized salt under expert guidance as a *preventive* of goiter in *goiter regions*.

tendency towards over-secretion. Thus the thyroid, stimulated by iodine, is whipped up into such a state of hyperthyroidism that even the discontinuance of iodine drugging may have no effect upon this unfortunate condition.

The second and more usual result of iodine taken without expert guidance is an increase in size of the goiter. In the chapter on the description of the normal thyroid gland it was stated that this organ consists of a series of tiny pockets containing a gelatinous substance called colloid. The administration of iodine always increased the quantity of colloid in these pockets to double, triple, or even ten times the normal quantity. As a result the entire gland, or, if there is a goiter, the entire mass, becomes tremendously increased in size.

It can thus be seen that the taking of iodine without careful guidance may bring on hyperthyroidism, a markedly increased size of the thyroid, or both.

SYMPTOMS OF IODINE POISONING.

A person susceptible to iodine poisoning taking iodine through iodized salt or tablets, or a patented "goiter cure," or some sort of "obesity cure," may present no symptoms for a few weeks or months. Gradually, however, there comes on an indescribable feeling of weakness, possibly a reddish eruption on the skin, with or without itching, some shortness in breath, and fatigue on the slightest exertion. Soon palpitation and even pains over the heart occur. In the meantime there is a feeling of pressure over the

thyroid gland. An examination soon reveals that the gland is larger. If there is a goiter, pressure by the mass may become so great as to render swallowing difficult and give rise to sensations of choking, especially when lying down at night. The appetite has now become greatly diminished or entirely lost and there is a reduction in weight. As great a loss as 40 or 50 pounds within several months has been observed. A physician is now sought and it is discovered that the basal metabolic rate has become dangerously high. A reading of plus 50 and more is common.

IODINE IN EXOPHTHALMIC GOITER.

The publicity given iodine in the prevention of endemic simple goiter has also led to the frequent administration of the drug in exophthalmic goiter. Very likely iodine lowers the operative mortality rate if employed before operation. But the reason for operation in exophthalmic goiter does not bear close analysis, if we take into account the fact that one-third of my exophthalmic goiter patients presenting themselves for treatment had already been operated upon one or more times and are as badly off as ever. This statement might be called into question were I the only observer insisting upon it. But when surgeons and others frankly admit that though operation may improve, it lacks rationality and does not stand the test of time, we must conclude that the question is still an open one, to say the least. This problem will be discussed in detail in Part II.

Iodine may improve exophthalmic goiter temporarily, probably in a manner somewhat similar to the use of bromides in epilepsy. But while bromides in epilepsy may be given in increasing dosage with practically no substantial harm, the continuation of iodine in exophthalmic goiter leads to disaster. I have seen this drug productive of such enormous swelling of the thyroid gland as to result in almost fatal choking from pressure, and the remaining symptoms of the disease were brought to such a high peak of crisis as to render it apparently impossible to bring the patient back to safety.

SUMMARY.

1. The use of iodine as a *preventive* of goiter in goiter districts or belts, as discussed by Dr. Robert Olesen in Chapter VIII, has been amply proved to be a tremendous service in the interests of public health.

2. We must bear in mind that even in goiter districts some individuals are so sensitive to iodine as to be injured by even minute doses. Hence prevention of goiter, as pointed out in Chapter IX, should be conducted under proper guidance.

3. As pointed out by Dr. Olesen and by many other competent observers, prevention should not be confused with cure. While one person's thyroid may appear benefited through the use of iodine, a dozen may become worse and even dangerously ill by the taking of this drug as a cure.

4. Iodine in the treatment of exophthalmic goiter may yield temporary benefit but is capable of engendering a secondary harmful reaction which may endanger the patient's life.

CHAPTER XI.

TREATMENT OF GOITER.

As in the case of other diseases to which man is heir, so also in the treatment of goiter the advertising "doctors" are reaping a harvest not only to the detriment of the patient's pocketbook, but what is worse, with serious harm to health. Quack doctors and patent medicine concerns appear to be more numerous in this country than in Europe, despite legislative enactments intended to protect the public.

BEWARE OF THE QUACK.

Samuel Hopkins Adams, in an article in Collier's[1] Magazine, issue of October 7, 1905, makes the following elucidating statement of the enormity of the patent medicine evil in the United States:

"Gullible America will spend this year some seventy millions of dollars in the purchase of patent medicines. In consideration of this sum it will swallow large quantities of alcohol, an appalling amount of opiates and narcotics, a wide assortment of varied drugs ranging from powerful and dangerous heart depressants to insidious liver stimulants; and, far in excess of all other ingredients, undiluted fraud. For fraud exploited by the skillfulest of advertising bunco men is the basis of the trade. Should the newspapers, the magazines and the medical journals refuse their pages to this class of advertisements, the patent medicine business in five years would be as scandalously historic

[1] Reproduced by kind permission of Collier's, The National Weekly.

as the South Sea Bubble, and the nation would be richer not only in lives and money, but in drunkards and drug fiends saved."

During the twenty-three years since the above paragraph was written, the magnitude of the patent medicine evil has quadrupled, with corresponding destruction of health and life. In the same article in Collier's, Mr. Adams calls attention to the presence of an inner conscience in first class apothecary proprietors who are compelled to carry in stock many nostrums which they feel are an offense to intelligence and health. Again to quote this writer:

"A cut-rate store, the Economical Drug Company of Chicago, started on a campaign and displayed a sign in the window reading:

PLEASE DO NOT ASK US

What is ANY OLD PATENT MEDICINE Worth?

For you embarrass us, as our honest answer must be that

IT IS WORTHLESS

If you mean to ask at what price we sell it, that is an entirely different proposition.

When sick, consult a good physician. It is the only proper course. And you will find it cheaper in the end than self-medication with worthless "patent" nostrums.

"This was followed up by the salesmen's informing all applicants for the prominent nostrums that they were wasting money. Yet, with all this that store was unable to get rid of its patent medicine trade, and today nostrums comprise one-third of its entire business. They comprise about two-thirds of that of the average small store."

LOOK OUT FOR FADDISM, TOO.

In the treatment of goiter as in other illnesses, there are faddists in the form of laymen, quasi-medical and even at times medical individuals who insist upon a certain mode of procedure as unerring in the successful treatment of the patient. We note occasionally that "goiter requires operation," and nothing is said of discrimination of the various types of goiter into surgical and non-surgical varieties. Also, the fact that operation upon certain types of goiter is not only dangerous but often fatal is ignored. Again, we are informed that iodine is the cure-all, despite the fact that this drug possesses a tremendous potentiality for harm. The tendency toward standing pat upon certain methods or views is more harmful in health matters and disease than it is in politics. We must remain openminded and receptive to information and facts for and against each and all methods of procedure known to have any influence upon this question. No one treatment can be employed as a standard in all goiters. The treatment of diseases of the thyroid must be based upon individualization and discrimination.[1]

[1] The tendency toward faddism extends not only to the matter of the taking of medicines and the desire to be operated upon without

Some goiters are uncertain or borderline, others distinct and obvious. Some are temporary, others permanent. Some goiters are harmless, others harmful. Most are preventable, a few are not. Some goiters require operation as their only treatment, in others operation is not only futile but harmful and frequently fatal. Some patients are improved by iodine, most are harmed by this drug. Some goiters are tumors, others are really allies to the individual, being an expression of the defensive mechanism of the body to combat poisons originating elsewhere, and as such are temporary, disappearing with the improvement in the condition of the individual as a whole. This latter is the characteristic of exophthalmic goiter, a condition which, strictly speaking, should not be included under the definition of goiter but within the category of constitutional affections.

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sufficient reason, but also in the direction of so-called physical culture. Perhaps the following quotation will exemplify this trend:

"Several years ago I saw an advertisement in a magazine which showed a big brute of a man with a leopard skin thrown over his shoulder. I wanted to be like that too; so I clipped the coupon for details, absolutely no obligation on my part. Well, at any rate, I took the course, but feeling that I wasn't getting enough progress for my money, I stopped; it didn't make me a perfect specimen of health no matter how much I read the book.

"Then I joined the gym. I did want to be healthy. I stopped that after I broke my leg. Next I tried boxing, but somehow or other that seemed to lose its zest too when I had my nose broken in three places. As a last resort I took cold showers every day, winter and summer. I gave this up also the winter I was in the hospital for three months with pneumonia. I decided that I wasn't cut out to be a specimen of perfect health; that was six years ago.

"I haven't had a sick moment since that day."—C. C. N. Y. Mercury.

The most important consideration in the treatment of goiter is to determine at the outset whether operative or non-operative attention is required.

GOITERS REQUIRING OPERATION.

In Chapter V, discussing varieties of goiter, it was stated that goiters which are tumor masses require operation. Among tumorous goiters are adenomatous goiters, cystic goiters, fibrous goiters, and any combination of these. They may be either simple or non-toxic, or toxic, that is, associated with hyperthyroidism.

A toxic adenoma, that is, a tumorous goiter which has assumed the rôle of throwing too much thyroid secretion into the blood, must be operated upon as soon as feasible. Since a patient with a goiter of this sort is frequently in a very low state of health, it is usually advisable before operation is performed to institute such medical attention as a prolonged period of rest, careful dieting, possibly the use of medicines and other measures which the case in hand appears to require.

As a result of this attention, there occurs in the usual case of toxic adenoma a reduction of the toxicity as proved by a reduction of the basal metabolic rate, improved heart rate, increase in weight, in short an increase in vital resistance, so as to render thyroidectomy a relatively riskless procedure. This is accomplished in accordance with the principles set forth in the treatment of exophthalmic goiter. In the minimum of instances, possibly in 25 per cent., the

toxic symptoms can be entirely eliminated by these efforts, thus converting a toxic adenoma back again into a simple one with restoration of the basal metabolism to normal, and return of health, happiness and utility to the sufferer. Thus, if the adenoma happens to be a small one, hardly tangible on inspection, the patient may be regarded practically as cured, though ideally speaking, it would be well to remove the goiter at this time in order to safeguard the individual against a future recurrence of symptoms.

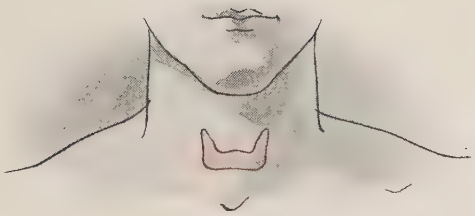
Irrespective of their inherent structure, all goiters which extend behind the breast bone into the chest are potentially surgical, for they give rise to dangerous pressure symptoms and interference with circulatory and respiratory functions. (See Chapter V, for intrathoracic goiter.)

Any goiter, irrespective of structure, which is so large as to cause compression symptoms upon the throat is likewise potentially surgical. Non-tumorous goiters, however, rarely become large enough to produce pressure symptoms.

GOITERS WHICH MUST NOT BE OPERATED UPON.

These have been termed in Chapter V, non-tumorous or non-surgical goiters. They are hypertrophic goiter, colloid goiter, hyperplastic goiter of puberty or adolescence, and the goiter incident to exophthalmic goiter (Graves's disease).[1] Any attempt to remove the mass by operative means may result in

[1] A discussion of exophthalmic goiter comprises Part II of this work.



A.—Diagrammatic representation of normal thyroid gland.

B.—Diagrammatic representation of tumorous goiter, such as occurs in adenoma, or cystic goiter.

C.—Diagrammatic representation of non-tumorous goiter, such as occurs in colloid or exophthalmic goiter.

Fig. 6.

regeneration (regrowth) of the goiter in course of time. In addition, removal of such a goiter by the knife may lead to serious bodily deterioration from hypothyroidism. Indeed, hypertrophic and colloid goiters are evidences of an already existing thyroid deficiency, as proved by the lowered basal metabolism rate commonly observed in these patients. Operation, then, is a decidedly irrational procedure.

DIFFERENCES BETWEEN SURGICAL AND NON-SURGICAL GOITER.

Precision in diagnosis of the type of goiter in any case requires, of course, the skill and experience of a physician. It is exceedingly unwise for a layman to attempt this task. For the reader, however, who desires to know *something* about this subject, we might, to illustrate, compare for a moment the small U-shaped mass representing the normal thyroid gland to a dry sponge as in Fig. 6, *A*. Now, if you can in your mind's eye attach a lemon or an orange or a baseball to this dry U-shaped sponge as in Fig. 6, *B*, you have a diagrammatic picture of what is meant by a surgical goiter. The removal of this attached mass constitutes the operation. There is sufficient normal thyroid structure behind the mass to conform with the bodily needs. The removal of this mass by the knife is usually quite a safe procedure, and recovery is complete.

On the other hand, again imagine the small, dry U-shaped sponge dipped into a fluid. It will swell and increase to several times its size as in Fig. 6, *C*. Here you have no added substance to speak of, yet

the thyroid gland is swollen into goiter formation. This is, diagrammatically speaking, the kind of goiter which may be regarded as non-surgical and should not be operated upon.[1] Appropriate medical attention will unload this "sponge," and in the course of time it will again shrink to its normal size. Cutting off a portion of this distended thyroid gland is attacking the wrong end of the situation, for the swelling of the thyroid is a *result* of conditions originating elsewhere in the body. The physician in attendance, overcoming the *cause* of the swelling, succeeds in unloading the distension of the thyroid gland, and recovery is complete.

We might state the differences between goiters requiring operation and those that do not in the following tabulation:

Goiter Requiring Operation.	Goiter Not to be Operated Upon.
1. Usually of long duration, at least several years, occasionally 30 to 40 years.	1. Usually of recent occurrence, several months to 2 or 3 years, as a rule.
2. Often very large; occasionally retrosternal or intrathoracic.	2. Usually slight or moderate in size; rarely dips down behind the sternum.
3. Very often a distinctly circumscribed mass on one or the other lobe or the isthmus.	3. Usually quite evenly distributed and symmetrical.
4. Resistant to the touch; no throbbing.	4. Yielding to the touch; throbbing in the presence of exophthalmic goiter.

[1] In exceptional cases there occurs a combination of tumorous and non-tumorous structures requiring the doctor's special consideration.

5. Occurs in well established adult life as a rule.	5. Occurs most often in childhood, during puberty, adolescence, or early adult life.

TREATMENT OF NON-TUMOROUS (NON-SURGICAL) GOITERS.

The first principle in the treatment of non-tumorous goiter is to endeavor to discover and eliminate the cause. It is not a question of the administration of iodine, for we have discussed this phase of the matter very amply and have concluded that this drug given in minute doses to individuals, especially children residing in goiter belts, may serve to *prevent* goiter formation, but ordinarily cannot *cure* an already existing lump on the neck.

ELIMINATION OF DISCOVERABLE CAUSE.

While in one individual the cause may be found in infected teeth, tonsils, nasal passages, or elsewhere, in another it may be due to intestinal intoxication. In one case the cause of the goiter is excessive meat eating and other indiscretions in diet; in another, it may be determined that undernutrition or unhygienic surroundings are the responsible factors. We must also remember that the stress and strain of undue physical and mental activities, the physiological changes incident to puberty and adolescence and pregnancy, play their part in the production of non-operative goiter. That these are likewise productive of surgical goiter is true, but surgical goiter is the result of neglect of non-surgical thyroid enlargements, as has already been mentioned. It is the duty

of the physician in charge to make an inventory of the patient's habits, physical condition, hygienic and even sociological status, with a view to correcting physical and mental flaws that may have any bearing upon the thyroid abnormality.

Infectious foci in teeth, tonsils, and elsewhere must be overcome at once. The intestines must be kept in good functional condition. The diet must be properly adjusted. Undernutrition, if present, must be overcome by all the means at the physician's disposal. Physical and mental activities must be so adjusted as to conform with the individual's biological needs. During puberty and adolescence and pregnancy, the goiter tendency can be overcome by proper advice and the administration of appropriate medicines.

It must be emphasized that though a goiter of this sort *may* disappear without attention, this is taking a gambler's chance. All large unsightly goiters, as well as other types of the disease which endanger the very life of the individual, have had their origin in just such apparently harmless swellings which were permitted to go on without adequate attention, on the theory that Nature would take care of them unassisted. Attention to a thyroid swelling which is not yet marked enough to be noticeable will prevent much future regret. Goiters treated in their early stages respond to very simple remedial measures.

THE DIET.

The details of the diet recommended in the treatment of goiter in general are given in the Chapter on

Eating and the Thyroid. Since the thyroid gland has been proved to undergo enlargement during excessive meat eating, it follows that animal food should be reduced to a minimum, or if this be no hardship, that it be entirely eliminated from the dietary. Such substances as tea, coffee, condiments, and the spices are to be omitted. These substances are stimulants and irritants, and in a sense poisons. Since the thyroid gland is a poison-fighting mechanism, the taking of irritants would tend to maintain the organ in a state of swelling. The quantity of food to be taken should suffice to yield the maximum standard of weight. Five or six pounds above this would be even more desirable, since the medicine given by the physician may tend to effect a slight reduction should the food intake be inadequate. In persons who are undernourished, and especially if undernourishment appears to be the *cause* of the goiter, it is highly important that the food intake be considerably above the accustomed quantity for a period of time sufficient to result in a weight somewhat above the normal standard.

HYGIENIC TREATMENT.

The matter of eating slowly enough to favor proper digestion, attention to the bowels, the taking of an adequate quantity of sleep in a well ventilated bedroom, the proper care of the skin, the maintenance of a proper balance between mental and physical work and recreation; these and other phases of the life of the individual must be taken into account, with common sense as the guide. The sexual life

of the individual must likewise receive proper guidance, for, as has already been mentioned, the thyroid gland is intimately related to the sexual mechanism.

MEDICINAL TREATMENT.

Since this book is intended primarily for the layman, we can only mention briefly the medicinal phase of the treatment of simple goiter. It is the physician in charge who must determine which drug should be employed in the case in hand. Rarely he will find iodine of distinct service. Most often he will discover that minute doses of thyroid extract will yield very good results. The physician also knows that these drugs are exceedingly potent for harm and will therefore warn the patient to see him with sufficient frequency to permit of careful observations and discontinuance or change of dosage of the medicine, as required. Small doses of iron and other blood promoting medicines may be found of service in goiter patients who are anemic. Remedies to overcome poor digestion and constipation may likewise be employed.

Finally, we must repeat that the layman must never permit himself to yield to the temptation toward self-drugging or to entrust himself to advertising quacks.

In the next few chapters we shall be concerned with a discussion of that interesting condition known as exophthalmic goiter or Graves's disease.

Fig. 7.—Recovery from colloid goiter without operation. (Both pictures represent the same individual, the first before treatment, the second when cured.)

Fig. 8.—Recovery from hypertrophic goiter without operation. (Both pictures represent the same individual, the first before treatment, the second when cured.)

PART II

CHAPTER XII.

DESCRIPTION OF EXOPHTHALMIC GOITER.

Exophthalmic goiter is the most interesting disease in the domain of medicine, since it involves not only all the ductless glands and the involuntary nervous system, but even the character and temperament of the individual.

DEFINITION.

Exophthalmic goiter is known as Graves's disease in England and America, Basedow's disease in Germany, Parry's disease in Scotland, Flajani's disease in Italy, and is occasionally spoken of as hyperplastic goiter, primary toxic goiter, and dysthyroidism.

The disease may be defined technically as a chronic, rarely acute disturbed function of the ductless glands and of the vegetative nervous system, associated with rapid heart, trembling, increased basal metabolism, loss in weight, weakness, emotionalism, dermographia (writing on the skin), a relative immunity to quinine poisoning, and usually also a swelling of the thyroid gland and bulging of the eyes.

EXOPHTHALMIC GOITER IS NOT HYPERTHYROIDISM.

Patients suffering from exophthalmic goiter are not in any strict sense of the term suffering from so-called toxic goiter. The latter term is properly applicable to toxic adenoma or hyperthyroidism, described elsewhere. The toxicity of the thyroid gland

in exophthalmic goiter is in reality a reaction to defend the body against irritating influences originating elsewhere in the body. It is an ally, not an enemy, an evidence of Nature's immunizing mechanism. The swelling of the thyroid gland in this disease is not the cause but the result of the disease, being a mere constituent of the many phenomena presented by the patient.

INVOLVEMENT OF OTHER DUCTLESS GLANDS.

Exophthalmic goiter may rightly be called a pluriglandular disease. The *pancreatic* function is diminished as evidenced by a tendency toward increased quantity of sugar in the blood and urine. Uncommonly actual diabetes may supervene as a complication. *Pituitary* participation is indicated by the lowered blood-pressure, the occasional acromegalic[1] features and other signs of a deficiency of the posterior and increase of the anterior lobe of the pituitary gland. *Suprarenal* involvement is indicated by the patches of pigmentation seen in a percentage of patients and the lowered blood-pressure observed, as well as white streaking of the skin at points in contact with the clothing or where stroked lightly with the fingernail. Deficiency of *ovarian* function is indicated by the commonly observed absent menstruation, sterility, and miscarriages. *Parathyroid* involvement is expressed by the trembling of the body and by the tendency toward undue bleeding from a wound. The *thymus* gland is usually enlarged and

[1] Acromegalic refers to the physiognomy observed in acromegaly. See Appendix.

is looked upon by some as the partial cause of rapid heart, shortness in breath and mental excitability. Other glands, especially the *pineal* gland, *liver* and *kidneys* are involved in this disease. Indeed, were we to describe the disease in detail, we might discuss it with relation to every inch of the body.

THE INVOLUNTARY NERVOUS SYSTEM.

That part of the nervous system over which we have no control, known technically as the autonomic or vegetative nervous system, is divisible into two parts, namely, the sympathetic and the parasympathetic, and is intimately related to the ductless glands. Since all the ductless glands are involved in exophthalmic goiter, the involuntary nervous system is of necessity likewise involved. The sympathetic and parasympathetic portions of the involuntary nervous system are antagonistic one to the other, and under normal conditions, by a checking action, they maintain the bodily functions at the proper equilibrium. During exophthalmic goiter, however, this checking is disturbed with resulting upset equilibrium in the various functions of the body. The degree of this disturbance varies with the individual. Depending upon whether the sympathetic or the parasympathetic phase of the disturbance dominates the symptoms, the terms *sympatheticotonia* and *parasympathetico-tonia* (or *vagotonia*) respectively, are often employed.[1]

[1] I mention this merely for the sake of completion in the description of exophthalmic goiter, but refrain from a detailed indulgence in technicalities since this book is intended primarily for the lay reader.

TYPES OF EXOPHTHALMIC GOITER.

The malady is divisible into several types the most important of which are: (*a*) The *forme fruste* or incipient type in which the evidences of the malady are early and mild; (*b*) the average type of usual severity; (*c*) the advanced type with evidences of damage to the heart and other vital organs because of the duration of the disease; (*d*) the thyroid type presenting an unusually swollen thyroid gland; (*e*) the cardiac type in which the heart symptoms dominate the complaint; (*f*) the gastrointestinal type associated with distressing nausea, vomiting, and diarrhea; (*g*) the nervous type in which the mental activities are so quickened as to engender symptoms of approaching insanity; (*h*) the pancreatic type associated with an unusual degree of carbohydrate intolerance with a tendency toward diabetes; (*i*) the adrenal type with exceedingly lowered blood-pressure, undue exhaustion and large patches of bronzed discoloration of the skin; and (*j*) the acute type with extremely high fever, marked prostration and delirium, proving fatal in a few weeks. Fortunately, this latter type of the disease is exceedingly rare.

These types are not usually clear-cut as such. The average case presents a combination of symptoms involving practically the entire body. The division into types merely indicates an *accentuation* of symptoms referable to one part of the body as compared with the rest.

EARLY EXOPHTHALMIC GOITER.

The incipient case of the disease is frequently difficult to recognize, since the symptoms may not be urgent enough to be noticeable. It often happens that early exophthalmic goiter is diagnosed as early tuberculosis, nervousness, neurasthenia, nervous indigestion, hysteria, nervous breakdown, and many other more technical conditions. The affection usually occurs in young adults leading an active mental life. The pulse rate is above normal, becoming markedly increased on slight physical and mental exertion; excessive sweating is common; the eyes are brilliant; the thyroid gland may or may not be enlarged; there is usually an unaccountable tendency to loss in weight though in some the weight may be normal or even slightly above; there is a marked tendency to early fatigue. Mentally, these individuals may appear bright, though rather nervous and touchy and susceptible to moods, sentimentality and emotionalism. To all intents and purposes these persons may seem perfect specimens of health because of the abnormal quantity of blood at the surface of the body giving rise to an appearance of ruddiness.

THE AVERAGE CASE OF EXOPHTHALMIC GOITER.

While in a small percentage of instances the usual form of the disease is of sudden onset, most often it appears weeks or months after the occurrence of an exciting cause. Take, for instance, the case of a man[1] who has met with an automobile accident or

[1] We speak here of the male for purposes of description; the disease is most common in females.

was held up by a highwayman or had gone through the intense worriment of business reverses. Coincidentally there occur nervousness, restlessness, trembling and heart palpitation. These gradually become aggravated, and within a few weeks the patient experiences difficulty in controlling himself and shows an unaccountable tendency to moods such as crying or laughing on slight provocation. Palpitation be-

Fig. 9.—Examples of typical exophthalmic goiter or Graves's disease. Note the large neck, bulging eyes and expression of fright. These patients possess non-tumorous goiters not requiring operation.

coming worse, he becomes anxious about himself and decides that he ought to see a doctor. This step, however, is postponed, and soon on looking into the mirror he suddenly discovers that his eyes are bulging. Trembling becomes worse, and there is an increasing looseness of the clothes ordinarily worn, indicating a rapid loss in weight. Despite this fact, however, a strange thing has happened: The collars ordinarily worn have become tight. He feels his neck

and discovers that his thyroid gland is swollen. Becoming alarmed, he consults his physician at last, and the diagnosis of exophthalmic goiter is revealed.

During this time, the individual cannot convince himself that he is really sick. The disease has so quickened his faculties, so stimulated and exhilarated his capacities that on being questioned, his ready response is: "I feel fine. Couldn't feel better." The fact is that he does *feel* fine, as fine as the fellow who, having taken two or three cups of steaming coffee, is so whipped up by the caffeine that he is ready to do a whole day's work anew. An effort to accomplish this, however, results in the realization that the ambition is in excess of capability.

THE MIND.

Mental changes, though usually within normal limits, are the rule in exophthalmic goiter. Restlessness, irritability, impatience and other changes in behavior may precede the various other symptoms of the disease by weeks or months. Will power and inhibition are greatly reduced and occasionally entirely effaced, and the unpolished self with its accentuated faults and foibles comes to the surface. Crying, anger, anxiety, laughter, melancholy and other mental moods and states may succeed one another with irrelevancy. A sense of bewilderment occurs in marked cases—a feeling of unreality and strangeness—a sense of disorientation in which the person seems to be walking about in a strange world. The mental faculties are quickened not only to the extent

of impatience with everything and everyone, but even with time itself. This individual's world is different, one of speed and pep, despite the fact that he cannot participate in the speed. It is indeed a confused jumble of desire to do things and lack of ability to do them. Thinking, judging, talking, walking, eating, and other activities of life are accomplished with the speed of a fireman suddenly aroused to combat a conflagration. When the patient enters the doctor's office he "breezes" in, flops down on a chair, twitches and turns and twists and grimaces during the moments of waiting; when called to the inner office he arises as though frightened, rushes in, flops down again on another chair, and details his complaints breathlessly. Be it said in fairness to these patients that the narration of the symptoms, despite the haste, is made with the intelligence of premeditated analysis, for exophthalmic goiter does not often occur in a stupid individual.

This change in behavior, associated with the characteristic physiognomy of the patient, results in a feeling on the part of some friends and relatives that he has become queer.

THE EXPRESSION OR PHYSIOGNOMY.

The typical features of exophthalmic goiter have rightly been termed those of frozen fright. The peculiar stare in the expression due to the bulging eyes and the loss in weight is not unlike that observed when a person is suddenly frightened. Since the exciting cause of the disease is usually one asso-

ciated with a scare or shock, the term frozen fright applied to the physiognomy of the patient is apt.

TREMBLING.

A sensation of trembling is experienced early in the disease. Later it becomes so marked that the very chair upon which the individual sits may vibrate with him. Tremor of the outstretched fingers and toes is easily demonstrable by the doctor on examination. An attempt to take a tumblerful of water to the lips results in the spilling of some of it before the act is completed.

HEART SYMPTOMS.

Every patient with this disease has heart symptoms. Discomfort over the heart and a sense of palpitation are usual. These are intensified during physical or mental stress and strain and frequently during attempts at sleeping on the left side. The heart and pulse rate which normally should vary between 68 and 78 per minute may be increased to anywhere between 90 and 160 or even higher. This gives rise to shortness in breath, especially on climbing stairs and other modes of exertion. The heart hurry is constant, day and night.

The blood-pressure is usually lower than normal.

THE GOITER.

Though absent in approximately 20 per cent. of patients, swelling of the thyroid occurs sooner or later in the remainder. It asserts itself in men when collars become tight despite loss of bodily weight,

and in women by an undue convexity or protrusion of the front of the neck. The swelling as a rule occurs months after all the other symptoms of the disease have been present. This is indicative of an awakening to the highest degree of the immunizing function of the thyroid against destructive forces originating elsewhere in the body. Also, this, as well as the fact that many patients present no goiter during the disease, is a telling argument against operation as a means of treatment. Often the absence of goiter indicates a rather severe form of the disease.

The swelling becoming larger, it is seen and felt to throb with the heart beats. This adds to the patient's discomfort, for the pulsation of the thyroid and of the blood-vessels of the neck is both embarrassing and a deterrent to sleep. The goiter is usually diffuse, corresponding practically to the shape of the normal thyroid gland but magnified. It is comparable to a small U-shaped dry sponge immersed in fluid. The thyroid swelling is actually due to a tremendous increase of the blood supply to the gland. It must be reiterated that the goiter of exophthalmic goiter is not tumorous and has never been known to become cancerous. Also, it does not often become large enough to cause marked pressure symptoms upon the throat.

PROTRUSION OF THE EYEBALLS (EXOPHTHALMOS).

This symptom is likewise inconstant. In a fair percentage of cases the eyes appear entirely normal during the course of the disease. In the majority,

however, protrusion of the eyeballs occurs. Rarely is this an early symptom; it usually takes place after nervousness, loss in weight, palpitation, and other signs are present. Both eyes are as a rule involved; occasionally, one eye protrudes first and the other follows later. More rarely, but one eye will protrude while the other remains normal throughout the course of the disease. Not infrequently both protrude, but one more markedly than the other. The bulging may vary from a slight stare during conversation to such marked protrusion as to appear as though the eyes are ready to pop out of their orbits, rendering it difficult for the patient to close the eyes during sleep.

Other technical eye signs characterizing the disease will not be mentioned in this work.

THE WEIGHT.

Whether the patient during former good health was normal in weight, underweight or obese, a history of having lost considerable weight during the illness is constant. An individual having weighed 200 pounds may in six months lose from 50 to 90 pounds; one having weighed 150 pounds may be reduced to 110 or less; and one having started as an undernourished individual may appear a veritable living skeleton. Instances have come to my attention in which one-half of the body weight was lost within less than a year.

We meet with an occasional paradox in which a slight increase in weight during the early stages of the disease has occurred. This is due to the increased

appetite frequently associated with the disease resulting in an intake of food considerably beyond the needs of the individual. As the basal metabolic rate rises and the advancing course of the disease asserts itself, weight is gradually lost and the patient again weighs normally; soon there is an evident substantial loss in weight and in time emaciation occurs.

Once in a while exophthalmic goiter appears in one who has always been obese. In such cases a loss of from 25 to even 75 pounds may not result in emaciation, but a mere disappearance of excess fat. If, however, the patient is not fortunate enough to receive proper treatment during the early stages of the disease, he, too, will soon become emaciated and present a history of having lost as much as one-half the body weight. If treatment is begun before emaciation has occurred, this type of individual progresses toward health more speedily than the others.

FATIGUE AND WEAKNESS.

An early symptom of exophthalmic goiter is fatigue after an honest effort to perform physical and mental duties. Weakness of the muscles of the thighs and calves is particularly characteristic. Occasionally a sensation of sudden paralysis of the limbs may be experienced, resulting in stumbling and falling at unexpected moments.

These patients are constantly keyed up and ready to expend latent energies. This is associated with a false sense of security insofar as physical and mental capacities are concerned. An attempt to carry out

the impulse to expend this energy results in the discovery that strength is limited and reacting fatigue rather severe. To exemplify, a rather self-analytical man insisted that continuous activity, including a 15 mile walk before bedtime was the best cure of his condition, despite the fact that he was suffering with a severe form of the disease. To quote: "When I am kept going and busy, as for instance, during a long walk or long swim, I feel fine, as though there is nothing the matter with me. When I don't do these things, that is, several hours after intense activity, I feel wretched." He failed to realize that he felt wretched *because of* the previous activities. He did not know that he had expended the little remaining reserve energy and now was a physiological bankrupt. Having become a bankrupt, fatigue was more intense than ever before, the heart action was whipped up to an unusual degree, the basal metabolic rate was higher than ever, and the limbs gave way completely.

THE DIGESTIVE TRACT.

Ordinarily the appetite in exophthalmic goiter is good, occasionally ravenous. It is, however, unsustained and capricious. Eating quickly soon overcomes the desire for food, leading to digestive disturbances. The habit of eating small bits during frequent intervals is common, the totality of food intake often being less than normal.

Nausea and other evidences of nervous indigestion and vomiting are observed. Digestive disturbances occasionally become so severe that, in the absence of

large neck and bulging eyes, the condition may be wrongly diagnosed as stomach ulcer or cancer, and more frequently as nervous indigestion.

While constipation may occur, diarrhea is more common. This symptom, through the associated discomfort and depression, may become very troublesome. An added tension, shock or worriment results in an intensification of diarrhea with aggravation of all other symptoms of the disease.

THE SKIN.

The skin is thin and moist. This is due to the fact that the sweat glands are excessively active. Despite the fact that the patient may be suffering with anemia, the color of the skin is rather florid, indicating an excess blood supply at the surface of the body. Stroking the skin with the back of the finger nail results in a marking known as dermographia (writing on the skin). This may be white or red, white with a red border, or red with a white border, and may vary in intensity and duration. Occasionally the marking of the skin is elevated like an elongated wheal.

Excessive sweating is frequently very annoying. The palms of the hands and soles of the feet are particularly moist, the cold, clammy hand of a patient with this disease being especially noticeable during handshaking. Even during the frigid temperature of winter these patients complain of undue surface heat and marked sweating.

A small percentage of subjects of exophthalmic goiter present pigmentation in varying degree. This

is due to involvement of the medulla portion of the suprarenal glands (see Appendix). These blotches appear on the face, arms, body, and even the gums.

Various skin eruptions and distressing itching may likewise occur, the latter symptom frequently being an added cause of sleeplessness. Even the hair may become brittle and fall out, and the nails become uncommonly breakable.

THE VOICE.

The stridulous, high-pitched, occasionally tremulous voice of exophthalmic goiter is characteristic, especially in severe cases. Hoarseness and a sensation of tickling in the throat with a dry cough are likewise common. This may be due to an enlarged thymus gland rather than to compression by the thyroid. Occasionally it is of nervous origin. Speech is hasty in the average patient.

THE LUNGS.

Lung expansion is reduced, and the frequency of respiratory action per minute is increased. Often there is observed a flattening of the chest not unlike that seen in those susceptible to tuberculosis.

Actual tuberculosis as a complication is uncommon. The sweating in exophthalmic goiter, especially at night, the slight increase in temperature, marked weakness, loss in weight, and other symptoms may *resemble* tuberculosis so that care must be taken in the making of an accurate diagnosis. Indeed, it is frequently difficult to differentiate early

cases from tuberculosis, but a few days' study of the patient clears up the diagnosis.

BLADDER IRRITABILITY.

This symptom may be so marked as to cause added restlessness during the night because of the need for arising several times to expel the bladder contents.

MENSTRUAL DISTURBANCES AND STERILITY.

Deficient and even absent menstruation is common in this disease. Menstruation may be absent for several months to a year or even longer, depending upon the severity and duration of the illness. Less often the various forms of menstrual irregularity occur.

Pregnancy is rare during the course of the disease. A good sign of approaching recovery or actual cure is conception with successful termination of pregnancy.

SLEEP.

Were sleep satisfactory in this disease, the patient would find life fairly tolerable. Unfortunately, insomnia is the rule. Pounding of the heart against the chest wall, throbbing of the blood-vessels of the neck and ears, occasionally actual pain about the heart, extreme sweating, a sensation of trembling of the body, bladder irritability, diarrhea, neuritis (especially of the shoulders and arms), itching of the skin, an excitable mind—these are a few of the reasons why the patient sleeps poorly or not at all, arising in the morning more tired than on retiring.

THE TEMPERATURE.

Sensations of heat complained of by the patient are due to the excessive basal metabolism. Occasionally the temperature may rise to unusual height, though ordinarily one half to one or two degrees above normal is observed. These patients dread the summer months and look forward with pleasurable anticipation to the comfort of a cold winter.

THE BASAL METABOLISM.

Basal metabolic tests are described in a previous chapter. To repeat, the normal is anywhere between minus 12 and plus 12, but in exophthalmic goiter it is very much higher, reaching anywhere between plus 15 per cent. and plus 80, 90, 100, or even higher. While these tests are not imperative to the diagnosis of the case by an expert, they must be performed if the physician is uncertain of his diagnosis. They are likewise useful in checking up the results of treatment and the confirmation of recovery.

The taking of a basal metabolism test is an art. Errors are frequently committed resulting in incorrect interpretations from improperly adjusted apparatus, lack of cooperation of the patient, inexperience of the technician, and many other factors. The technician must not only "know his stuff" but be one who is thoroughly acquainted with human nature and make his patient feel perfectly at ease. Properly done, there should be no discomfort to the patient during the performance of an 8 or 10 minutes' test.

A PARADOXICAL COMBINATION.

In a percentage of patients who have been operated upon for this disease there is observed a combination of hypothyroidism (myxedema) with the symptoms of exophthalmic goiter. The patient had been improved for a while, when there occurs an increase in weight despite a deficiency of food intake; the skin becomes waxy and dry, the mental functions are obtunded, the eyelids and ankles become somewhat puffy, while the evidences of the former exophthalmic goiter such as bulging eyes, trembling and nervousness, heart symptoms and weakness still persist in varying quantity and quality. This combination is frequently referred to as the coexistence of hypo- with hyperthyroidism.

Let us now in the next chapter discuss the most plausible *cause* of exophthalmic goiter.

CHAPTER XIII.

THE CAUSE OF EXOPHTHALMIC GOITER.[1]

The cause of exophthalmic goiter has been the subject of speculation for several generations. The numerous theories advanced in explanation of this malady are legion and would alone fill a large volume. Though we are nearer to the solution of the problem today than ever before, a few links are still missing in the chain of evidence to assist us in specific conclusions. One thing is certain: The cause of exophthalmic goiter is not in the thyroid gland itself.

EXOPHTHALMIC GOITER IS NOT GOITER.

In 1921, I[2] pointed out that exophthalmic goiter is not goiter; that the sooner this disease is removed from the classification of goiter the sooner will we progress toward a better understanding of the cause and treatment. The primary need is to change the name of the disease to something more significant. The term exophthalmic goiter implies the imperative existence of exophthalmos (bulging eyes) and goiter (enlarged thyroid), neither of which need be present in a person suffering with an otherwise typical case of the disease.

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[1] This and the next chapter contain matter modified from two of my articles in Endocrinology (Los Angeles): The Prevention of Exophthalmic Goiter, 1923, *7*, 415–430, and Psychic Trauma in the Pathogenesis of Exophthalmic Goiter, 1927, *11*, 106–116.

[2] I. Bram: Jour. Amer. Med. Assoc., 1921, *77*, 282.

IT IS A CONSTITUTIONAL DISEASE.

Exophthalmic goiter is not a disease of the thyroid, hence is not a local but a constitutional disease. In typhoid fever the spleen is swollen; in malaria the liver is swollen. Both are constitutional diseases with local manifestations. So in exophthalmic goiter the thyroid gland is swollen, and the swelling is not tumorous, but consists essentially of an increased blood supply in this organ. It is just as irrational to look upon exophthalmic goiter as a disease of the thyroid gland simply because this organ happens to be swollen, as it would be to look upon typhoid fever as a disease of the spleen or upon malaria as a disease of the liver.

HEREDITARY INFLUENCES.

The taking of a careful history of patients with exophthalmic goiter commonly yields three important facts: (*a*) Information to the effect that one or more blood relatives are or had been suffering with nervousness, exophthalmic goiter or diabetes; (*b*) that the individual has been more or less nervous since childhood; and (*c*) that the onset of the symptoms of the disease followed soon after the occurrence of some sort of shock. From the frequency with which this information is obtained, it is evident that heredity is a predisposing factor in this disease. Indeed, many of my patients report two, three, and even four members of the family as afflicted with or having suffered from exophthalmic goiter.

There are doubtless thousands of individuals susceptible to exophthalmic goiter who, unconscious of this tendency, are going through life in an apparently normal manner. The occurrence of an exciting cause serves as a torch to bring forth the manifestations of the disease in all its tragic picture.

THE AGE FACTOR.

Exophthalmic goiter may occur at almost any age. Though uncommon in the extremes of age, it has been known to appear in babies and in young children. Most often the disease is seen between the ages of 18 and 40, the average age being approximately 25. In my own series of cases, there are quite a few who are less than 12 years old; on the other hand, I now have under my care several who are over 60 years of age. My oldest patient is a woman of 78.

THE SEX FACTOR.

Females are more prone to exophthalmic goiter than males, the percentage of the former to the latter being approximately 4 to 1. The reason is the greater complexity of the female sexual mechanism and the greater sensitiveness of her nervous system.

While pregnancy is frequently the causal factor of simple goiter, it is rare to find exophthalmic goiter in a pregnant woman. Markoe,[1] for instance, found but 8 cases among the 100,000 pregnant women at the New York Lying-in Hospital. The fact is that

[1] J. W. Markoe: Jour. Amer. Med. Assoc., 1918, *71*, 877 (Abstract of Discussion).

sufferers from exophthalmic goiter are ordinarily sterile, conception being possible only after the patient is very much improved or has recovered. Indeed, a good sign of approaching recovery or actual cure of a woman who has been suffering with the symptoms of exophthalmic goiter is pregnancy with the delivery of the infant at term.

On the other hand, several instances of exophthalmic goiter have come to my attention in which the disease *followed* the birth of a baby. A woman by nature high-strung and susceptible to exophthalmic goiter may be so apprehensive over herself and offspring during the ordeal of childbirth that this may constitute a nervous and emotional shock sufficient to instigate an attack of exophthalmic goiter.

THE RACE FACTOR.

Exophthalmic goiter, like diabetes, is most apt to occur in those of a high-strung temperament. It is most prevalent in Caucasians, particularly among the Hebrews, the Irish, and the Latinic peoples. Mongolians are next in order in degree of susceptibility, the Negro being relatively immune.

EXOPHTHALMIC GOITER AND CIVILIZATION.

As implied, the Caucasians are most prone to the disease because they lead in the activities and strife characterizing the march of civilization. The disease is, therefore, most prevalent among those whose mental and emotional activities are at their highest.

Prior to 1914 the disease was not so common a condition. When the World War broke out and our

boys were sent to the front to face the unnatural, tensive and harrowing conditions, many developed symptoms variously diagnosed as shell shock, neurocirculatory asthenia, effort syndrome, and early tuberculosis. In course of time a large percentage of these cases turned out to be instances of exophthalmic goiter. Also, many parents, wives and sweethearts, left at home to worry, developed the disease, for it is a fact that the most potent exciting cause of this disease is the psychic trauma incident to shock, worry and other forms of mental strain.

Since the war, the standard of living has become universally changed, with an increased desire and demand for the luxuries of life. The craving to be amused has in many quarters become an obsession, asserting itself in diverse vicarious ways. Thus life in general has lost considerable of its wholesome simplicity, and has become artificial, strained, and self-consuming. Relaxation that is really relaxing has become a rare event in a goodly percentage of humanity; stage plays are tense with mystery, suspense, and exciting sex appeal; movies are likewise of a sort calculated to unearth the worst rather than the best from our inner makeup. Sleep, already abbreviated by this strenuosity incident to earning more dollars and taking in more entertainment, has become deficient in quantity and quality, and the mind in many of us is in more or less of a daze during waking hours. Strong coffee, questionable "soft" drinks, and bootleg liquor and other devices are employed in efforts to overcome the daily fag, thus adding another to the already existing devitaliz-

ing vicious circles. Since sleep is Nature's sweet restorer and now does not restore sufficiently, the individual as a whole must suffer, and the part which suffers most is the mechanism concerned in the production of exophthalmic goiter,—the ductless glands and the nervous system. When exophthalmic goiter does not actually occur, the susceptibility to it is greatly increased, so that an exciting cause which formerly could have been shed without reaction is capable of inciting the conflagration of the disease in the now inflammable individual.

Hence it is that exophthalmic goiter is more frequent now than it was when life was less tense and more meditative and simple. It is more frequent since jazz, speed, escapades of various sorts, divorces, night clubs, bootlegging, and related avocations have become popular.

INFECTIONS AND EXOPHTHALMIC GOITER.

Such general infections as influenza, pneumonia, tuberculosis and syphilis may bring on the symptoms of the disease indirectly by increasing susceptibility. It is not clear whether these are at any time *directly* provocative of exophthalmic goiter, though in about 3 per cent. of my cases no other cause could be elicited.

DISEASED TONSILS, TEETH, AND THE LIKE.

The same might be said of such local or focal infections as occur in tonsils, teeth, sinuses and elsewhere. Though on general sound principles we must

remove these areas of infection, especially diseased tonsils and teeth, they appear to play but a contributary rôle in the production of exophthalmic goiter. The mere removal of tonsils with the expectation of curing exophthalmic goiter is usually disappointing; diseased tonsils should be disposed of as a measure supplementary to more direct treatment in the management of the disease.

IODINE AND THYROID EXTRACT DRUGGING.

The harm wrought by the taking of iodine as an alleged cure for exophthalmic goiter or of simple goiter and the taking of quack obesity cures (most of which contain thyroid extract) with the object of reducing weight without consulting a physician are exciting causes in a considerable number of cases of exophthalmic goiter.

THE MOST USUAL CAUSE.

In at least 90 per cent. of sufferers from exophthalmic goiter there is obtained a history of a nervous shock, technically known as *psychic trauma,*[1] to account for the disease. Only a certain type of individual is susceptible to the development of exophthalmic goiter through any cause, especially nervous shock. The earmarks of susceptibility to the

[1] The term psychic trauma may be applied to conditions in which, with or without physical injury, the mind has received an impact or shock from which it does not readily recover to its former standard. The subconsciousness is especially involved. The shock may result from a cause which has operated suddenly or slowly. The instinct of fear is the basis of psychic trauma.

disease characterizing this type of individual are readily recognized by the experienced endocrinologist.

An individual presenting the typical earmarks may be regarded as possessing the predisposing "soil" for the implantation of the symptoms of exophthalmic goiter. Place a person of this sort in an automobile going at the rate of 50 miles an hour, and rush the machine across railroad tracks just in time to avert a collision with an approaching train, and the mechanism of exophthalmic goiter is begun. There need not be an accident. Following an earthquake, a fire in a large factory, a massacre, the wreck of a liner in midocean, harrowing incidents on the firing line in battle, or other situation of imminent peril to life, 49 out of 50 persons may quickly recover physical and mental poise and be themselves again. One of them, the type of individual above described, may evince no mental or endocrine readjustment. The trembling, the staring eyes, the clammy skin, the heart hurry, and other features expressing fright remain, become frozen as it were, and we are confronted with a case of exophthalmic goiter. The individual has been singled out of the crowd to become the victim of exophthalmic goiter in the situation in which the instinct of self-preservation was called upon to decide between fight or flight.

WORRY THE GREATEST INSTIGATOR.

By far the greatest percentage of patients suffering with exophthalmic goiter can trace the beginning of their complaints to a period of intense worriment.

This may be due to business reverses, illness of a loved one, disappointment in a love affair, and other conceivable mental states of like nature. It has frequently been said that worriment furnishes the greatest amount of "material" for the medical profession; we might emphasize the point that worriment supplies considerably more than half the number of exophthalmic goiter cases in our midst. Grief, anxiety, and other intense emotions are to be included in this category as capable of supplying the torch to ignite the inflammable material.

To illustrate, we might mention the following actual examples:

1. Miss E. K., age 15, was in an automobile accident.

2. Mrs. M. P., age 26, was frightened by a fire next door. The following day the police raided her house by mistake.

3. Mr. E. MacK., age 32, while serving as government inspector in a munitions factory during the World War, saw a freight train jump the track and land into a warehouse filled with shells.

4. Mrs. H. B., age 26, was badly frightened by being informed that she was suffering with tuberculosis.

5. Mr. C. S., age 24, met with an accident in which he sustained the loss of an eye.

6. Mrs. E. G., age 31, was caught in a subway fire.

7. Mr. L. B., age 32, was struck in the face by a golf ball.

8. Mrs. A. O., age 24, was badly shocked by the removal of tonsils under local anesthesia.

9. Mr. M. M., age 38, had an operation for appendicitis performed, and was badly frightened by the taking of ether.

10. Mrs. I. S., age 24, was shocked by seeing her child fall out of a second story window.

11. Mrs. R. B., age 25, witnessed the gasoline tank of an automobile and the occupant of the car on fire.

12. Mrs. P. A., age 35, was badly shocked by seeing her child develop convulsions.

13. Miss M. M., age 21, had a disappointment in a love affair.

14. Mrs. J. W., age 30, was suddenly awakened from sleep to be told that her next door neighbor had died.

15. Mrs. B. R., age 30, went to see a relative in an insane asylum and on her way out of the institution her pathway was blocked by a lunatic.

16. Mr. S. K., age 37, had severe financial strain during the past two years.

17. Mr. S. G., age 37, experienced the shock of two deaths in his family.

18. Miss H. K., age 23, had a narrow escape from drowning.

19. Mr. S. C., age 29, was made extremely nervous over the possibility of being sent to the front in the World War, though he was still in camp in this country.

20. Mr. S. B., age 41, had a nightmare in which he saw a man with an axe standing over his mother's bed about to decapitate her.

SUMMARY.

The usual cause of exophthalmic goiter may be stated as follows: 1. Individual predisposition or susceptibility is possessed by a percentage or "type" of humanity. 2. This predisposition constitutes the "soil" upon which an exciting cause in the nature of a shock (psychic trauma), such as actual or apparent peril to life and limb or a period of extreme anxiety, disappointment, or worry, instigates the onset of the disease.

CHAPTER XIV.

PREVENTION OF EXOPHTHALMIC GOITER.

Since exophthalmic goiter is not goiter but a constitutional disease, a discussion of its prevention must differ markedly from the comments on the prevention of goiter.

DIFFERENCE BETWEEN SUSCEPTIBILITY TO GOITER AND SUSCEPTIBILITY TO EXOPHTHALMIC GOITER.

In the formulation of plans for the prevention of exophthalmic goiter the recognition of the *type of individual* susceptible to the malady is important. A person prone to the development of *goiter* is rather unlikely to acquire exophthalmic goiter.

The candidate for goiter presents a normal or below normal basal metabolic rate, most often normal or above normal weight, frequently an unusually dry skin, a pulse tending toward undue slowness, physical and mental activities not unduly acute, and other features indicating either a normal or a deficient manufacture of thyroid secretion. In approximately 30 per cent. of instances a history of one or more cases of goiter in relatives is obtained.

On the other hand, susceptibility to *exophthalmic goiter* is associated with opposite characteristics. There may be a familial history of exophthalmic goiter, nervousness, or diabetes. The basal metabolism is either normal or above normal, the skin is

soft and moist, the pulse rate is apt to flare up on the slightest provocation, there is a tendency toward increased physical and mental alertness, the disposition is somewhat sensitive, and the individual usually presents a history of having been somewhat nervous or excitable throughout life.

It is well to remember that in goiter the lump on the neck is all that matters; it is usually a mere cosmetic question; the body is entirely well.[1] In exophthalmic goiter the neck is least complained of, but the entire body is sick—every inch of it.

THE NEED FOR PREVENTIVE EFFORTS.

There are many praiseworthy movements current in the interests of prevention of disease. Tuberculosis, diabetes, cancer and heart disease are receiving the attention of the medical profession and of men who are devoting their entire time to the study of these respective fields. These specialists are working quietly, continuously, unassumingly in their laboratories and hospitals, many becoming martyrs to science in their endeavors to wrest from Nature's storehouse of secrets another solution to the problems of life and of disease. Life is too short for any one person to know everything about everything in medicine. Indeed, life is even too short to know everything about one branch of medicine, whether this be the eyes, the lungs, the heart, diabetes, cancer, or goiter.

[1] Unless, of course, the goiter is large enough to produce pressure symptoms, or unless it has become toxic. These phases of the question are discussed in other chapters.

The difficulty with the question of exophthalmic goiter has been and largely still is the fact that it has not received the attention it deserves as a field for *exclusive* study. A movement by individual and organized effort in the direction of prevention of exophthalmic goiter is timely and important. Were the profession to devote as much effort to this subject as it does to tuberculosis or to diabetes, the number of exophthalmic goiter patients would be decidedly reduced, and the malady would not be the dread disease that it is.[1]

CANDIDATES FOR EXOPHTHALMIC GOITER CONSTITUTE A TYPE OF HUMANITY.

Everyone is capable of being classified into a "type" of humanity. Some are resistant to almost all diseases; some are susceptible to tuberculosis, others to diabetes, still others to goiter, a percentage to exophthalmic goiter, and so on. Prior to the development of the disease to which we are susceptible we may appear quite normal in the every day sense of the word. Yet on careful examination there are certain earmarks by which one may distinguish susceptibility to tuberculosis, to diabetes, and to other diseases, including exophthalmic goiter. A timely recognition of "type" may enable us to reenforce the bodily and mental processes in the direction of immunity to the malady.

[1] This is no criticism of the ethical medical profession. It merely justifies the trend toward specialization and indicates the need for an adequate number of goiter specialists. The science of medicine has reached such a stage in its evolution that a lifetime devoted even to one subject cannot cover its every phase.

Persons presenting the earmarks of susceptibility to exophthalmic goiter must be recognized early and guided toward a safe future. In this task the physician himself must possess, in addition to diagnostic ability, the tact and skill of the psychologist and mentor in the moulding of human behavior. Since the individual's "self" consists not only of Mr. A. or Miss B., but extends outward to family relationships as well, the physician must include the cooperation of relatives and friends in his plans toward physical and mental adjustment of the person in question.

INCREASING THE INDIVIDUAL'S RESISTANCE.

Susceptibility to exophthalmic goiter can be largely or entirely overcome. Ideally speaking, the strengthening of the physical and mental makeup should begin during childhood. This task must be continued in a subtle fashion at least up to well established adult life, the object being an attempt at perfection in hygienic, dietetic, and mental discipline. Though in some instances the elimination of influences predisposing to exophthalmic goiter may appear to be a task vague and difficult, much can be done by a gradual inculcation of principles which, in the course of time, would effect a satisfactory equilibrium between inherent peculiarities and susceptibilities on the one hand, and controllable circumstances and environments on the other. In brief, the adherence to the broad principles of the simple life is the goal.

To the boy or girl of high-strung parents, particularly those who have had exophthalmic goiter, home

training, especially table talk, is of importance and either makes or breaks the growing individual. It is to home influences that we largely owe our merits and our faults.

During school life mental impressions from teachers, class-mates and companions serve to mould the individual toward or away from susceptibility to exophthalmic goiter. Recreation plays an important rôle and should likewise be the subject of guidance by parents. Particularly are the movies a powerful factor in forming mental habits and character.

During puberty and adolescence sexual and emotional restlessness should be tempered by appropriate social, recreational and esthetic influences. This cannot be overemphasized, for it is during this period of life that the greatest turbulency of physical and mental processes exists, and it is now that exophthalmic goiter may assert itself.

The unfortunate feminine tendency today to become and remain thin to keep pace with the dictates of dame fashion is a potent devitalizer of the forces of resistance to exophthalmic goiter. Though the stout may occasionally acquire the disease, the vast majority of cases occur in persons who are scarcely normal in weight.

The topic of a career likewise becomes an important problem. Life's duties must be such as to incur the least amount of physical and mental irritation. If a college life is sought, with subsequent vocation in an educational, professional or business field, studies must not interfere with the normal health processes, and conscious efforts toward unusual

scholarship should be discouraged. Many a patient with exophthalmic goiter owes his or her plight to unwise and unbridled ambition.

Telephone operating with its nerve-wracking incidents, department store selling with the associated artificial lighting, ventilation, and drudgery in the performance of duties—these and other pursuits which do not correspond to happiness but rather reduce pleasure and leisure to a minimum call for correction.

Again, school teaching with its tense working hours and often as restless hours off duty, and social work among the poor with its depression may be mentioned in this connection. While these may be the vocations chosen by the individual, they may, after all, be the wrong choice, slowly but surely resulting in deterioration of health.

Such occupations as present the remote possibility of accidents, as employment on the topmost floor of an office building, with danger of fire or elevator mishaps, employment in locations where explosions are possible, and other such vocations must receive due consideration.

How to increase the threshold of emotional reaction[1] is the problem involved in the consideration of resistance to exophthalmic goiter. The substitution for a state of emotional alertness of an attitude of *sang froid*, in other words, the assumption by a thin-skinned individual of the so-called phlegmatic temperament is the goal.

[1] Threshold of emotional reaction is defined and discussed in the last chapter.

THE AVOIDANCE OF EXCITING CAUSES.

While infections in teeth, tonsils, and other parts of the body (conditions requiring prompt correction) and other miscellaneous factors may serve as exciting causes of exophthalmic goiter, by far the most important and most usual cause in a susceptible individual is a shock or psychic trauma. The avoidance of conditions upon which psychic trauma depends is often difficult, no matter how much preaching and teaching are directed toward prevention. However, the task is not futile, for having increased the person's resistance to the disease on the one hand, and having trained him to accept the knocks and bumps of life in a matter of fact way on the other, the task of prevention is reduced to definite terms and is successful in a sufficient percentage of instances highly to warrant its practice.

Since the taking of thyroid extract tablets as such or in the form of much advertised obesity cures is responsible for many cases of exophthalmic goiter, this practice must be discouraged. If you believe you weigh too much, consult a physician to pass judgment on your opinion. If he agrees with you, follow his advice. He may make a basal metabolism test to determine the degree of responsibility of your thyroid gland. Chances are that he will not prescribe thyroid but an appropriate dietary and perhaps other measures not contained in drug stores. Since the taking of iodine for an imaginary or actual goiter is likewise an occasional cause of exophthalmic goiter, this drug, too, should never be employed without the advice of a physician.

SUMMARY ON PREVENTION OF EXOPHTHALMIC GOITER.

The ideal mode of prevention of exophthalmic goiter should embrace the guidance of the individual susceptible to the disease from childhood well on into adult life, with a view to perfection in hygienic, dietetic and mental discipline. This may require that an individual standard of conduct be formulated. It is a twofold task—each contributing equally to the achievement of the goal, *viz.:* (1) The adjustment of the circumstances of life to the peculiarities of the individual, and (2) the modification and adaptation of the peculiarities of the individual to the circumstances of life. Though this task may appear abstruse in its implications and difficult of accomplishment, achieved results justify our efforts. If we can reduce susceptibility on the one hand, or modify the chances of the occurrence of exciting factors on the other, the prevention of exophthalmic goiter will have earned as important a place in preventive medicine as the prevention of tuberculosis, heart disease, or diabetes. In this connection we are not dealing with a potential or actual "lump on the neck;" we are concerned with a *type of individual* presenting peculiarities which may lead to the development of exophthalmic goiter, a constitutional disease.

How to increase resistance to exophthalmic goiter will be further discussed in the chapters comprising Part III of this work.

CHAPTER XV.

TREATMENT OF EXOPHTHALMIC GOITER.

At the outset it must be emphasized that the following remarks do not apply to goiter in general or to toxic adenoma[1] but to exophthalmic goiter or Graves's disease, the thyroid swelling of which, when present, is a non-tumorous, non-surgical mass.

OPERATION OF DOUBTFUL VALUE.

Since medicine is not an exact science, dealing as it does with the mysteries of health and life, there are many problems within it that are controversial. Exophthalmic goiter and its treatment constitutes one of the most debatable topics extant in medicine. It is for this reason that in the treatment of this malady two schools exist—the one which insists upon operation as the means of relief—the other which takes a broad view of the situation, claiming that this is a purely medical disease, requiring a more comprehensive approach in successful treatment.

THE THYROID SWELLING IS WELCOME.

The lump on the neck comes as a late event in this disease. First of all there exists the inherent pre-

[1] Toxic adenoma is described in Chapter VI. There are many things in common between it and exophthalmic goiter, but the points of difference must be recognized promptly since toxic adenoma requires operation while exophthalmic goiter does not. Surgeons save thousands of lives yearly by skillfully performed operations on toxic adenomas.

disposition; then, following the occurrence of an exciting cause in the form of a shock, perhaps an accident or a period of intense stress and strain, or possibly an infectious focus within the body, there develop increasing nervousness, tremor, undue quickening of thought and action, restlessness, sleeplessness, sweating, perhaps a little bulging of the eyes, and loss in weight. Weeks or months later the thyroid may begin to increase in size. Does it not seem absurd to blame it all on this swelling? Quite as absurd as to blame typhoid fever upon the coincidentally swollen spleen. The swelling of the thyroid gland is a welcome event. Indeed, some of the most serious cases of exophthalmic goiter occur in persons who at no time present an enlargement of the thyroid gland, nor, for that matter, bulging eyes.

SURGEONS, TOO, ARE FAIR AND CONSCIENTIOUS.

Be it said in fairness to reputable surgeons that when asked by a patient whether operation will result in *cure* of exophthalmic goiter no positive assurance is offered. The surgeon promises to do his best and that is the beginning and end of the situation. Indeed, no surgeon experienced with these cases will assure his patient of cure, for he knows the perils through which his charge must pass during and immediately after operation and is fully cognizant of the uncertainties of operative recovery. Reputable thyroid surgeons, in order to give these patients the best opportunities for restoration and usefulness, order a prolonged period of careful medical attention

prior to and immediately after operation. If the patient makes any kind of recovery, this result is due not to operation but to the many months of the accompanying medical attention insisted upon.

A CONTROVERSY BEING SETTLED.

The present trend is away from surgical interference in the treatment of exophthalmic goiter. The operative mortality rate in undoubted exophthalmic goiter is still high, at least 20 per cent. in operative clinics taken by and large. But even a *low* operative mortality rate is no excuse for operating if the disease itself is not cured through the procedure. Mere recovery from the operation itself is not synonymous with recovery from the disease for which operation is performed. The difficulty with this question has to a large extent been the confusion of operative recovery with recovery from the disease itself. Operation may yield temporary improvement, but the patient usually lapses back within from a few months to a few years into the former state of invalidism.

The fact that you know someone who had been operated upon for goiter and is now entirely well merely confuses this question. We are not discussing *goiter,* but *exophthalmic goiter,* a constitutional malady in which the thyroid, if swollen, is the end result. Patients with tumorous goiters including toxic adenoma *should* be operated upon for there is no other successful mode of treatment. Were exophthalmic goiter, as is toxic adenoma, due to hyperthyroidism,

cutting off the lump on the neck would be the only means of cure.

PATIENCE IS A VIRTUE.

Any treatment of exophthalmic goiter is a failure if quick, spectacular results are sought. The medical management of the disease takes into account the fact that not only the disease but the patient, too, requires attention. The non-operative management of these patients, to be eminently successful, embraces a régime of treatment comprehensive in nature and spread out during a period of several months. It is calculated not only to overcome cause and effect but also to reinforce the individual's resistance so that the lifelong susceptibility to the disease may be overcome and a future of perfect health and happiness assured.

QUANTITY *VERSUS* QUALITY.

To be sure, surgical clinics turn out a large number of exophthalmic goiter patients. But on analysis it is seen that the quantitative aspect of the question is unimportant. It is far better to cure permanently one patient than to operate upon a dozen and lose sight of them to whatever fate seems to befall them. Surgical clinics have little, if any opportunity actually to study these patients during a sufficient period of time to know enough about them. The endocrinologist, on the other hand, studies his case and patient zealously until he has guided his charge through to unequivocal permanent cure.

VIEWS OF OTHER OBSERVERS.

The following opinions on this question are interesting:

"The results following operation are not clear cut . . . The fall in basal metabolism may be considered as a grafting of an imperfectly antagonistic disease (myxedema) upon another disease (exophthalmic goiter)."[1]

"The longer one observes his patient (after operation), the less the percentage of cures. One by one, in the lapse of years step from the cured group. I have seen many patients operated by other surgeons who come after several years of improvement with a relapse. They state that their surgeon does not know of their renewed trouble. Therefore, that surgeon has her on his records as cured. No doubt some of my 'cures' are telling of their renewed trouble to some sympathetic surgeon."[2]

"My experience with surgery in exophthalmic goiter, both from the standpoint of mortality rates and results, is such as to dampen any enthusiasm I might otherwise have for this form of therapy."[3]

"In the last three years I have seen 22 patients who have submitted to surgery but continued to suffer from the same thyrotoxic symptoms that distressed them prior to operation. The basal metabolic rates of these patients ranged from minus 6 to plus 80 per cent. It must not be supposed that this group has not been skilfully operated upon, for many of them have journeyed to the best surgical clinics of the country."[4]

"For the past twenty years many thousands of patients have been subjected to surgical treatment for Graves's disease, but the scientific fruit from it all has been extremely small.

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[1] H. T. Hyman: Jour. Amer. Med. Assoc., 1925, *14*, 1022 (Abst. of Disc.).

[2] A. E. Hertzler: Diseases of the Thyroid Gland, C. V. Mosby Co., p. 126.

[3] J. M. Read: Amer. Jour. Med. Sci., Phila., 1926, *71*, 227.

[4] J. M. Read: Jour. Amer. Med. Assoc., 1924, *83*, 1963.

. . . The history of medicine shows that any therapeutic procedure that has remained long in doubt proved in the end to have no real value. If surgeons have been really curing their patients all these years they should certainly have contributed something to our knowledge on the subject. . . . They (the surgeons) plead that they, that is, the operators and patients, are satisfied with the results, so why should there be any question about the efficacy of the procedure. The same argument, in its time, has supported the prestige of the 'king's touch,' exorcism of Evil Spirits, 'Perkinism,' osteopathy and chiropractic. So there has been in ancient and modern therapy little profit to be derived of this kind of reasoning in the search of truth."[1]

Many more well-known surgeons and non-surgeons might be quoted[2] in like manner were this book intended solely for the medical profession.

The essence of this problem is contained in the words of that beloved physician, Sir James Mackenzie:

"The impression has got abroad that the feats of surgery are indications of the progress of medicine. When operations are carried out with a full knowledge of the morbid conditions which they are intended to relieve, and with a knowledge of the functions of the structure which the surgeon cuts in his operation, there might be some reason for regarding such surgery as an example of the progress of medicine; but when the surgeon is profoundly ignorant of the morbid condition for which he operates, and of the functions of the structures which he mutilates, it is impossible to conceive anything more detrimental to progress."[3]

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[1] C. F. Hoover: Amer. Jour. Med. Sci., 1927, *173*, 11.

[2] These are contained in my larger book on goiter.

[3] James Mackenzie: Lancet (London), 1924, *2*, 695.

THE SOLUTION OF THE PROBLEM.

In the last analysis the difficulty with this problem lies in the fact that there are still too few endocrinologists to take care of the great number of these patients.[1] Were more members of the medical profession to give this subject the time and concentration and sacrifice it deserves, non-operative cures of exophthalmic goiter would be the rule, and reputable surgeons, realizing this fact, would yield this field to the expertly equipped non-surgeon or endocrinologist.

MEDICAL TREATMENT.

By the medical treatment of this disease is meant not merely putting the patient to bed and giving him a drug. This definition of the term is responsible for many "medical" failures with resultant apparent need for operation. The patient must be treated in a very broad and comprehensive manner as herein implied. If this is done and cooperation obtains, at least 95 per cent. of all exophthalmic goiter patients will be rewarded by conclusive permanent restoration to health and happiness.

In exophthalmic goiter it may rightly be said with reference to treatment that "what is one man's meat is another man's poison." Unless a careful study of the patient behind the disease is made progress will be tardy and discouraging. Successful outcome depends upon *individualization*. While one patient may

[1] I might add that one out of every three exophthalmic goiter patients reaching me in consultation had already been unsuccessfully operated upon one or more times.

improve through the use of cold baths, in another these may produce nervousness. While most patients get along very well with an entirely non-flesh dietary, a percentage require the occasional addition of lamb chops, fish, or fowl in order to avoid monotony of diet. Some patients can stay in bed for many hours and be content; in others remaining in bed is a severe form of punishment. While in one patient a drug may be of service, in many this same drug is harmful. One patient will thrive on sympathy; another is quickly fed up on it and loathes the doctor or relative who is too gushy, preferring an ordinary, sincere, matter-of-fact attitude. Some patients progress best when the disease is explained to them in all its detail; others had best be kept ignorant of its nature on the basis that a little knowledge is a dangerous thing.

EARLY TREATMENT MEANS EARLY RECOVERY.

Since time and life are synonymous, treatment had best be instituted at the very earliest moment. The late case may present a damaged heart and is very trying to the medical attendant. The early case under expert attention may continue toward recovery even while at work if wage-earning is imperative. However, while the advanced patient is difficult to manage, he is by no means hopeless, for sincere cooperation with the doctor will even here bring about splendid results.

COOPERATION IS VITAL.

Unless teamwork obtains, no matter how expert the treatment, progress is next to impossible. *Mili-*

tary discipline in the carrying out of the doctor's instructions is imperative. The patient who promises to do everything and does little will discredit his physician and destroy himself. The patient must never say "I'll try," but must say "I *will* obey all your orders," and keep his promise.

WORK DURING TREATMENT.

In approximately 50 per cent. of cases the patient's activities, whether housekeeping or wage earning, need not be discontinued while under treatment. If the duties are enervating from a physical or mental viewpoint, a modification must be made. As progress continues there may be a gradual return to former activities. Patients with more severe forms of the disease are kept from their duties for an average of from three to six months until marked improvement occurs, when they are gradually initiated back to former activities. Severely sick patients must go through a period of a modified rest program, the proper environment being taken into account.

PLACING THE PATIENT.

While some patients can get along at home during the period of treatment, others cannot. If the home is characterized by tranquillity, concord and warm mutual regard, this is as good a place as any. If, on the other hand, the home lacks these qualities and is a house where frowns, antagonism, and warfare prevail, the patient must be sent away at once. Where shall it be?

Not a hospital, for hospitalization cannot cure these patients. An atmosphere of pain and moans and groans is no place for one who requires the contagion of health and smiles and good cheer.

Ordinarily I do not permit a subject of exophthalmic goiter to approach the seashore until a year after recovery has elapsed. There is something about sea air that is not conducive to the best interests of the patient. Seventy-five per cent. of the patients I have known to have gone to the seashore against the advice of the physician have returned feeling very much worse.

To send the patient to the country is taking the chance of distance from the necessary medical attention and frequently of questionable food. If, however, a country place close to proper medical attention is discovered and is at an elevation of 1000 to 2000 feet above the sea level and presents the proper dietary and environmental qualifications, it is a good place to send the patient. Since these patients tolerate heat poorly, care must be taken to select a country place where the summers are not oppressively hot.

The average sanitarium is a place where many incurables abound. If, however, the sanitarium is so equipped as to present a congenial, homelike atmosphere, successfully eliminating the usual sick-bed flavor, this is a good place for the patient. The vital needs are congenial, tranquil surroundings, pleasant, understanding nurses and attendants, and expert individualization in the treatment of the disease.

THE REST PROGRAM.

Ordinarily it is not necessary to put the patient to bed at absolute rest. Unless the case is very far advanced and the heart badly dilated, the patient may be out of bed during a portion of the day. A stay in bed from 9 P.M. to 11 A.M. and from 2 to 4 P.M. is sufficient for the majority. The hours out of bed may be spent in pleasant conversation, the reading of light literature, listening to music, and the playing of light games. Housewives may be permitted some light housekeeping and perhaps a little cooking.

A competent observer has said: "If an individual with exophthalmic goiter could be made to hibernate[1] like a bear, he would probably come out cured." Theoretically, hibernation would be ideal. But patients with exophthalmic goiter do not progress satisfactorily unless some of their physical and mental turbulency is given an outlet by periods out of bed and some diversion. A few hours spent in a comfortable arm-chair is rest for the patient and yet not as objectionable as is staying in bed. Moreover, the patient need not be deprived of the pleasure of sitting at the family dinner table once or twice a day,

[1] Hibernation is a peculiar state of suspended animation in which many animals pass the winter season. Some bears, raccoons, badgers, skunks, opossums, porcupines, woodchucks, and ground squirrels spend some months of the year in hibernation. Bats, the hedgehog, reptiles, such fish as carp, minnows, eels, land snails and many insects likewise, hibernate. Even man is known to hibernate. In India, for instance, some religious ascetics are capable of throwing themselves into unconsciousness for variable periods of time. Draid, in a small treatise on human hibernation published in 1850, narrates the case of a fakir who was buried alive and was dug up and restored to consciousness several months after.

or even of a slow, short walk in the open, weather permitting.

Rest of mind is even more important than rest of body. All factors conducive to excitement and emotionalism must receive prompt effort at elimination. This concerns not only such intrinsic factors as doubts, suspicions, obsessions, business cares, religious, marital or sexual matters, but also various extrinsic factors as false friends, misunderstanding relatives, noisy children, curious neighbors, a jealous, scolding helpmate, and domineering in-laws. The patient's psychic makeup must be thoroughly understood and the necessary allowances made in the interests of a restoration to nervous stability.

SLEEP AND RELAXATION.

The time spent in bed does not mean that it must be entirely devoted to sleep. Depending upon the individual, from nine to twelve hours should be spent in sleep until recovery is at hand, when it may be reduced. The remaining hours in bed should be devoted to complete relaxation. The art of relaxation can be acquired by anyone, with a little training. It consists of an effort to mimic paralysis by relaxing the limbs so completely that there is no awareness of their existence. The mind, too, can be trained to be devoid of thought and its content made as blank as a sheet of white paper.

EXERCISE.

Swimming, tennis, skating, baseball playing and the like must be prohibited during treatment and un-

til a year or more has elapsed from the time of discharge from observation. Driving an automobile is likewise a questionable form of exercise, for in this day of congested traffic the numerous thrills and accidents occurring are sufficient to keep body and mind in continuous tension.

When substantial increase in weight, reduction in pulse rate and lowering of basal metabolism have occurred, deep breathing exercises may be practiced. A slow walk in the open may soon be permitted, and in moderate cases allowed from the very beginning of treatment. As progress is manifest, carefully planned calisthenic exercise is prescribed. In patients permitted to work while under treatment these instructions are modified.

If acceptable to the patient, there is no objection from the very start to the vibrator and such passive exercise as massage.

WATER TREATMENT.

Hydrotherapy requires no special comment in this illness. A daily bed bath, and if the heart rate is not excessive a tub bath may be permitted. A cold sponge in the morning is permissible. The water should not be above the temperature of the atmosphere, but rather slightly below it.

The drinking of great quantities of water should be discouraged. These patients sweat excessively and are apt to fill themselves with too much water because of the excessive thirst. In so doing, the ability to take sufficient milk and even solid food is diminished. Moreover, excessive water drinking, by over-

loading the circulatory system, is likely to increase the labor of an already overworked heart.

The use of cold water in the form of an ice bag over an excited heart assists in the reduction of its rate and the overcoming of distressing palpitation. A small ice bag over the thyroid gland is occasionally useful when the swelling is above the average. Of course, the question of whether to employ these means and for what periods of time should be left to the discretion of the physician.

THE DIET.

The diet in exophthalmic goiter is by no means a hardship. Qualitatively, aside from the prohibition of excessive meat eating, tea, coffee, spices, condiments and the like, the diet does not differ from that of any normal being. It is based purely on common sense grounds calculated not only to maintain the equilibrium of the ductless glands but likewise the health of anyone interested in a wholesome dietary.

Quantitatively, the diet in exophthalmic goiter must take into account the following points: (1) The amount of food ordinarily required by a normal person of the same sex, age and height; (2) the amount of food necessary to offset the excessive burning down processes of the disease; (3) the quantity required to regain the weight already lost during the course of the illness, and (4) the still further addition of food necessary to effect an increase of from 5 to 10 per cent. over and above the normal standard of weight as a requirement of safety at the time the patient is discharged from active treatment. This

means that for a period of time the average patient must learn to take from 50 to 100 per cent. more food than does a normal person of the same sex, age and height. The details of such a dietary are described in the chapter on Eating and the Thyroid.

SMOKING AND OTHER HABITS.

The elimination of bad habits in eating, drinking, working, resting, thinking and other phases of daily life is of vital importance. A sane, logical analysis of the physical and mental life of the individual will lead to the discovery of the need for the correction of many irregularities.

The importance of the elimination of the tobacco habit cannot be overestimated. The nicotine in tobacco is a very potent poison.[1] It harms the individual in two ways: First, as a general poison requiring excessive work on the part of the thyroid for its elimination from the system; second, as a dilator of the blood-vessels of the body including those of the thyroid gland. Moreover, it has a direct effect upon the nervous and ductless gland system, disturb-

[1] The idea current in the minds of some laymen that cigars or a pipe are relatively harmless as compared to cigarettes is fallacious. A cigar is equivalent in tobacco and nicotine content to about ten cigarettes. With regard to a pipe, the constant smoking of one of these contraptions leads to the inhalation and absorption of an indefinite quantity of nicotine. The idea that the paper in cigarettes is poisonous is likewise fallacious. Cigarettes are relatively milder, but these also should be discontinued unequivocally. We are dealing not with how little poison a person can take, but with the need for discontinuance. An exophthalmic goiter patient or indeed any patient with a ductless gland disturbance cannot become and remain well as a tobacco habitué.

ing their structure and function to such marked degree as to abbreviate existence by years. There is no such thing as a short life and a sweet one, the argument often presented by the tobacco habitué. A life that is short is diminished because of its bitterness. It is the long life that is sweet because it has been healthy.

Merely to taper off the supply of tobacco is not good practice. Immediately to discard the present supply and forget the existence of the weed is the simplest and most successful means of accomplishing this end and requires no effort but determination.

MEDICINES.

The physician in attendance may find medicines useful depending upon the individual case. The type of the disease as well as the type of individual possessing it must be accounted for in scientific treatment. In the event of faithful cooperation in all other phases of attention, some few patients will progress satisfactorily without medicines. The greater number require one or more well selected drugs to overcome the various vicious circles[1] characterizing the disease. Digestive and intestinal disturbances, palpitation, sleeplessness, nervousness and other symptoms often require medicinal remedies. The experienced physician finds little difficulty in determining whether, when and how a drug is to be used. He finds that in

[1] A vicious circle is the term applied to a situation in which a cause having been productive of an effect, the latter in turn becomes a cause, perpetuating the existence of the former. Thus cause and effect each are both cause and effect.

the medicinal treatment of the patient he need select but one or two drugs out of a total of eight or ten which have been found of singular service in exophthalmic goiter.[1]

THE QUESTION OF DISEASED TONSILS, TEETH, ETC.

If the tonsils or teeth are infected, they must receive attention as soon as conditions permit. Occasionally infections in pelvic organs, appendix, or gall-bladder are included in this problem.

The doctor will not advise removal of tonsils or teeth during the height of the illness. When the basal metabolism, heart rate and weight are decidedly improved, infected areas of the body should be corrected with the least possible coincidental shock to the patient. Whether or not these areas are the *cause* of the disease, their correction is imperative and will expedite recovery.

MENTAL ADJUSTMENT OR PSYCHOTHERAPY.

In no other disease is it more important to realize that the mind is quite as sick as the body. This is apparent when it is recalled that exophthalmic goiter originates largely in the nervous system; that it occurs as an improper adjustment, in a person with a lifelong high-strung temperament, of a situation in which the nervous forces were brought to a state of defending the body from an overwhelming impact. As a result, the previous dormant weaknesses in the

[1] The medicines advocated are mentioned in my larger book on goiter intended for physicians.

ductless gland and nervous systems are now so accentuated as to engender a veritable chaos of functional abnormalities, with quickening of the emotional centers, peculiarities in behavior, restlessness, trembling, and other features characterizing the mental aspect of the disease. An attitude of bear and forbear on the part of relatives, with the exhibition of sufficient sympathy, affection, tact and diplomacy will start matters along in the right direction.

The physician must be permitted to dominate the situation, including advice to husband, wife, parents, or friends, as the case may be, in the interests of tranquillity. Peace of mind is what the patient needs most of all—PEACE writ large. A further discussion of this aspect of the problem is contained in the chapter on Thinking and the Thyroid.

CHOOSE THE PATIENT'S CALLERS.

Not all families have relatives and friends that are assets to harmony. Some relatives and so-called friends may inject ideas into the patient's mind which impede the establishment of the necessary mental poise. Unless a visitor can carry a sincere smile and convey a funny story and make the patient feel glad of his presence, he or she should be informed to keep away. At all events, the patient had best be given the quietude of as few visitors as possible. Not more than two should be permitted at a time and at no hours other than 4.30 to 5.30 or 7.30 to 8.30 P.M.

RECREATION AN ASSET.

The mind of these patients needs some diversion. Foremost in this category is pleasant reading.

Such stuff as is contained in "yellow" newspapers, spicy literature, lurid tales of so-called romance, and other matter which excites and tantalizes and stimulates the imagination should be prohibited. The best reading matter for these individuals is found in short stories of a light vein. Mark Twain's Sketches and Literary Essays, Jerome K. Jerome's Three Men in a Boat, Arthur Guiterman's The Laughing Muse and The Light Guitar, Octavus Roy Cohen's stories in the negro dialect, H. C. Witwer's and Ring Lardner's stories, the writings of Temple Bailey, Joseph C. Lincoln, Frances H. Burnett, Margaret Widdemer, and P. G. Wodehouse; Mary Roberts Rinehart's Tish stories, Irvin S. Cobb's stories, and the writings of Milt Gross can be read with pleasure and profit, the object being the maintenance of an external and internal smile, with its accompanying glow of joviality and relaxation.

The radio is another means of diversion. There are two sides to this story, however. Among recent newly coined terms "radio widow" and "radio widower" have come into existence. Sitting by the radio until 11, 12, and even the wee hours of the morn, to the exclusion of all other interests, has become a bad habit with some folk. The sick one, especially, because of an impaired inhibition or will power, may thus bring about further deterioration in health by deficiency and irregularity of sleep. The radio in

patients with exophthalmic goiter must cease its activities at 9 P.M. sharp.

Properly employed, the radio is a most useful asset in assisting the individual to forget his idleness and participate passively in the activities of the world. Not alone is the music a means of relaxation and recreation, but the talks enable the listener to keep abreast of the times.

Victrola or phonographic records may be included as a means of relaxation and pleasure. Of course, in the matter of music the proper selection of material is to be considered on the basis of individualization, bearing in mind that exciting or melancholy music should be banned.

Such miscellaneous diversions as the playing of bridge or other games of chance in which there is considerable pride in winning and depression in losing, result in restlessness and discomfiture. In some, however, this is a means of recreation, and losing is looked upon as a phase of sportsmanship.

An automobile trip through the country, a visit to the art gallery, perhaps a steamer trip on a fresh water body, all these make for a diversion of interest and are conducive to mental tranquillity.

DURATION OF TREATMENT.

A chronic illness such as exophthalmic goiter requires a sort of chronic treatment. When it is recalled that predisposition has been lifelong and that the disease itself has existed during a period of from several months to several years, an attitude of im-

patience is illogical. The average case of exophthalmic goiter properly handled in an atmosphere of cooperation requires several months of treatment. In early cases, only three or four months are necessary. In very severe, prolonged cases in which the heart has become considerably damaged, a year or longer may be required ere restoration of circulatory balance and the ability to resume customary duties occur.

It is not a question of thyroid stimulation or thyroid poisoning, it is simply a situation in which the *ductless glands as a whole* and the vegetative nervous system, including the mentality of the individual, the circulation and other structures and functions of the body must be trained away from morbid habits toward normal, permanent stability. This cannot be accomplished by the mere cutting off of the lump on the neck and the stay of two or three weeks at a hospital.

To repeat, if a broad regime of treatment as herein outlined is instituted, recovery from exophthalmic goiter though apparently slow, is sure. Progress is not a straight line of favorable events, for there are ups and downs even in normal health. To exemplify, the patient's weight may be increased by ten pounds or more during the first two or three weeks. The ensuing week or two may show scarcely any gain at all. The week or two following this may have in store another substantial increase in weight. The same might be said of the pulse rate, the sense of well-being, and even the basal metabolic rate.

This not only explains the usual trend of progress, but also shows the difference between improvement and recovery. Any point between the beginning of treatment and recovery is mere improvement, a *step* toward cure, not cure itself. It is only when the top is reached that the patient is safe.

THE REWARD OF PATIENCE.

Merely to *feel* very much better is not sufficient. Nothing short of recovery is our goal. We might compare a person with any chronic illness with one who has sustained a broken leg. What is done in this case? The patient is put to bed and appliances are employed to keep the fragments in proper position. Soon a plaster of paris cast is used. By and by the patient is permitted up with the use of crutches. Later, one crutch is discarded. Within a couple of weeks the remaining one is put aside, and a cane is used in walking. Finally even this is discarded, for the limb is permanently strong again. What would happen if such a patient, when merely improved, that is, when permitted out of bed with crutches, were to discard these supports and act as though he were entirely normal and endeavor to walk about because he "feels" better? Very likely the limb would break once more, and back to bed he would go for an indefinite period. This is exactly what may happen to a patient under treatment for exophthalmic goiter who, through impatience or misinformation or overconfidence, translates improvement into recovery. The patient must continue on with undiminished en-

thusiasm until the doctor and his tests have proved that recovery is at hand and there is no further need of "crutches," which in this case consisted of rest, diet, medicines, mental adjustment, and other phases of treatment described. Having reached this point, there is a gradual tapering off of instructions; increasing exercise or work is prescribed, and the patient is once more a normal individual serving self and society.

THE DAWN OF GOOD HEALTH.

The strict orders given the patient during treatment are now gradually relaxed. Having gotten all the weight planned for the patient, the extra nourishments may be discontinued. It will be found that despite a lessened food intake the weight still remains at its maximum. If the weight continues to rise (which indicates a satisfactory basal metabolic rate), the bread allowance at meal time may be reduced. This must be done gradually and the weight carefully watched to avoid loss. Now, instead of a caloric intake of 5000 or 6000 units, much less is taken, and still the weight is satisfactory. This is the best proof of recovery from exophthalmic goiter. With regard to the quality of the food, no change should be made, for the diet upon which the patient was placed is based on common sense and may be followed throughout life.

The rest program is likewise modified at this time. At first the patient may be permitted to retire an hour later than usual. Within three or four weeks the afternoon rest may be reduced to one hour.

Shortly thereafter the entire afternoon rest may be omitted. Soon it is found that eight or nine hours in bed are sufficient.

Exercise is also increased, beginning with a longer walk each afternoon, corresponding to two or three miles a day. Calisthenics during a period of fifteen or twenty minutes morning and afternoon are now prescribed. When it is found that the heart reaction to normal exercise is scarcely different from that occurring in anyone else, all other normal duties may be permitted.

During this time, recreation may be increased if desired. Attendance at an evening theatrical performance or lecture or meeting once a week is permissible. Care must be taken to avoid attendance at tragic or extremely dramatic performances, for there must be no return of emotionalism. Attendance even at a ball game may be indulged in. By no means must an opportunity be missed to attend an entertainment of humor and fun.

WHAT HAPPENS TO THE LUMP ON THE NECK?

Since, as it was stated, the lump on the neck in exophthalmic goiter is not the cause of the disease, but the disease is the cause of the lump, the thyroid swelling may persist during the entire period of treatment. Splendid progress in all directions is manifest, a return to normal of weight, pulse rate, metabolism, and strength, and even the eyes; still the swelling may persist. *It disappears speedily and forever only when the patient has reached normal in*

every other respect. The patient need not worry about the neck; indeed, my usual exhortation is: "Forget you have a neck; the thyroid swelling is the tail end of the disease and came last; it will disappear last, when it has no more poisons to fight." By the time the patient has been feeling perfectly well for a month or two the thyroid swelling has disappeared.

WHAT CONSTITUTES RECOVERY?

The indices of cure of exophthalmic goiter are: (1) Return of the basal metabolic rate to normal, that is, between minus 12 and plus 12 per cent., (2) reduction of the heart rate to normal, that is, between 68 and 78 beats per minute; (3) increase of weight to normal plus 5 to 10 per cent. above for good measure; (4) disappearance of trembling; (5) disappearance of bulging of the eyes; (6) disappearance of goiter; (7) the appearance of a cool, calm, tranquil attitude toward self and the world at large, with return of efficiency to normal and the enjoyment of perfect health.

CONCLUSIVENESS OF RECOVERY.

Contrary to what may be said of the usual surgical result in the treatment of exophthalmic goiter, the result of treatment as herein outlined is complete and permanent. Patients discharged from this regime of attention are quite different from their former selves. The previous excitability, impatience, and quickening of physical and mental functions have given way to an attitude of peace, tranquillity, and

poise. The most vital requirement of permanent recovery from the disease, namely, deliberation and ease of thought and action, is now evident to all. Taught how to eat, how to sleep, how to work, how to play, how to laugh, and even how to think, the discharged patient enjoys unprecedented health and is more useful than ever to self and society.

Fig. 10.—Recovery from exophthalmic goiter without operation. First picture represents the individual when acutely sick. Second picture is the same individual cured.

Fig. 11.—Recovery from exophthalmic goiter without operation. First picture represents the individual when acutely sick. Second picture is the same individual cured.

PART III

NOTE.—In the preceding chapters it was pointed out directly and by implication that exophthalmic goiter and the usual forms of thyroid disturbance are due in large measure to avoidable errors in the conduct of life. In the following remarks on eating, sleeping and thinking further suggestions favoring the maintenance of normal thyroid function are offered.

CHAPTER XVI.

EATING AND THE THYROID.

The food we eat has a bearing on the structure and function of the thyroid gland. What to eat, what not to eat, when to eat, how to eat and how much to eat are factors which should be based not upon fads or whims of appetite, but common sense.

THE FLESH FOOD QUESTION.

Flesh or meat foods, derived from animals slaughtered for the purpose, should not be taken excessively. When we take a morsel of flesh we take nutriment plus the poison of metabolism of the animal. When flesh foods are taken in small quantities, these poisons known as purin-producing chemicals are fairly well coped with by individuals with a normal thyroid, kidneys, liver, skin and other structures. In the presence of susceptibility to thyroid disease, however, this organ, by nature a poison-fighting gland, is placed under an undue strain and may become swollen, undergo increased activity, or both. A mere *restriction* of meats to a minimum may be all that is required to maintain a normal physiological equilibrium.

Many reliable observers have commented on the advisability of a restricted meat diet. Loeb,[1] for in-

[1] L. Loeb: Jour. Med. Res. (Boston), 1919, *40*, 199.

stance, after feeding meat to guinea pigs, found that there occurred within three weeks an enlargement of the thyroid gland. Professor von Müller[1] of Munich calls attention to the fact that during the World War the enormous restrictions in the use of meat resulted in a disappearance of gout, and in fully developed cases of gout, the joints involved were distinctly improved. Lorand[2] points out that man is by nature constructed to be neither carnivorous nor herbivorous. While our teeth resemble those of omnivorous animals, our intestines compare with those of the carnivorous animals, as they are not as long as those intended to assimilate great quantities of herbs and vegetables. Schiff and others (quoted by Lorand) have shown that when the thyroid is removed in a dog and the animal is fed on meat or bouillon, it develops convulsions and dies within a short time. Breisacher has demonstrated that these animals can be kept alive for a long time if deprived of meat and fed on a milk diet. A normal thyroid offers sufficient immunity to overcome the poisons of moderate meat eating. In those suffering from deficient thyroid activity (myxedema), meat eating results in more depression than ever. Lorand further calls attention to the influence of food upon mankind in general, pointing to the Eskimo and to the Batwa and Wambuti dwarf tribes of tropical Africa who are stunted in growth because they subsist almost exclusively

[1] F. von Müller: Observations during the Period of Undernourishment in Germany, Bull. New York Acad. Med., *2*, 502 (Oct., Nov.), 1926.

[2] A. Lorand: Old Age Deferred, F. A. Davis Co. (Phila.).

upon a meat diet. Man eats too much meat and too little food of the vegetable kingdom.

THE VEGETARIAN DIET.

A purely vegetarian diet is not satisfactory for many reasons. We cannot, however, overlook the apparent advantages of a strictly non-flesh dietary characterizing the lives of many millions of people in India. These persons, taught by their religion to revere life on the basis of their belief in the transmigration of souls, do not kill anything unless in self-defense, hence are forced to subsist exclusively upon non-flesh foods. Among these people there is less gout, less Bright's disease, less cancer, less fighting, and more peaceful meditation than anywhere else in the world. Surely this should give us material for thought.

When we speak of a *non-flesh* dietary we do not mean a *vegetarian* mode of living. We may still take such foods originating from the animal kingdom as require no slaughter, *i.e.,* eggs, milk, butter, cheese, and the like.

AN IDEAL DIETARY.

A dietary that avoids the extremes, containing within it a minimum of flesh foods, is advocated. A mixed dietary consisting of vegetables, cereals, and such animal substances as milk, butter and eggs, supplemented by a small quantity of flesh food if desirable, is the ideal combination. Fowl, lamb and fish, taken three or four times a week, add variety to a carefully outlined menu of non-flesh food.

DESTRUCTIVE "APPETIZERS."

The spices and condiments such as mustard, catsup, Worcestershire and tabasco sauce, pepper, horse radish and other substances that bite the tongue injure not only the thyroid gland but most other organs of the body. If a substance can irritate the tongue, how much more likely it is to irritate such structures of the body as the lining of the stomach and intestines and the kidneys!

Many a case of stomach ulcer and cancer and even Bright"s disease can be traced to the habit of taking these appetizers. An appetite must come from within, not from artificial irritants. In those with a weak thyroid gland, this organ is most apt to suffer from the "appetizer" habit.

"SOFT" DRINKS ARE HARD ON HEALTH.

Some beverages, too, may be classified as irritants. The ginger in ginger ale, the carbon dioxide gas in carbonated beverages, the caffeine in coffee, tea, and coca cola, and the various alcoholic beverages (quite procurable, Volstead notwithstanding) are harmful especially to persons possessing a susceptibility to thyroid disease. Caffeine and alcohol, in addition, stimulate and irritate the circulatory and nervous systems, in this manner adding further damage to thyroid disturbance, for a turbulent circulatory or nervous system is in itself sufficient to whip up the thyroid gland into hyperthyroidism and goiter formation.

FOODS PERMITTED IN A SENSIBLE DIETARY.

Those interested in a dietary favoring a healthy thyroid and good general health will find the following suggestions liberal enough to permit of permanent adoption:

The permitted *fruits* are oranges, grapefruit, stewed prunes, raisins, cantaloupe, honey dew, stewed or raw apples, pears, peaches, cherries, apricots, plums and pineapple. *Bananas may be taken only if over-ripe.* Canned fruits of the recent crop may be used in winter.

Permitted *cereals* are oatmeal, barley, rice, farina, hominy, mush, buckwheat cakes.

Bread may be taken toasted or otherwise, preferably a day old. Whole wheat bread and rye bread may be taken if desired and properly tolerated. Those who must gain considerable weight should be urged to take four slices of bread, corresponding to four ounces, at each meal.

Eggs may be taken raw (if properly tolerated), soft boiled, poached, fried or scrambled.

Fresh cream or cottage *cheese* is a splendid food.

Vegetables permitted are peas, beans, lentils, cauliflower, spinach, asparagus, lettuce, small quantity red tomatoes, squash, cucumbers, carrots, onions, beets, corn, eggplant, oyster plant.

Potatoes may be baked, mashed, boiled, French fried, in fritters, or in soup.

Fritters made of potatoes, apples, rice, corn, squash, and cheese, are useful ingredients of a varied dietary.

Soups may be as follows: Vegetable, barley, rice, noodle, potato, corn, onion, pea, bean.

Flesh foods may be taken sparingly—about half an adult's share—three or four times a week—in the form of fowl, lamb or fish.

Desserts permitted are puddings made of bread, apples, rice, tapioca, corn starch, chocolate, raisins, nuts, figs, dates, cup custard and ice cream.

Of the permissible *beverages* the ideal is milk taken hot or cold. Buttermilk is likewise highly advocated, and Postum and hot chocolate may be taken as desired. Those who have been in the habit of taking coffee and miss it very much, might be permitted a cup or two of Kaffee Hag or Sanka. These are coffee from which nearly all the caffeine has been extracted.

COMMENTS ON PERMISSIBLE FOODS.

The permissible fats for frying purposes are butter, Crisco, and olive oil.

Eggs are a good substitute for beef steak, minus the objections of the latter. Some people, however, have an aversion to eggs. There is so much phosphorus in egg yolk that it is apt to irritate a delicate liver. The average person can manage to take from four to eight eggs a day with ease. If there is some mental aversion to eggs at the beginning, this may be overcome by taking them in various forms. If raw eggs cannot be tolerated, they may be taken soft boiled, or as milk and egg shakes, flavored with chocolate or vanilla, or beaten up in orange juice, or in other modes which successfully disguise them.

Milk is a perfect food for infants, not for adults. In grown-ups it is more a supplement than a mainstay. To take great quantities of milk in preference to other foods with a view to increasing weight and strength leads to disappointment. Milk ordinarily contains 88 per cent. of water, and in order to have this substance increase weight, it would be necessary to take several quarts a day, which is an impossible quantity. If, however, milk is used as a beverage instead of water, weight is bound to increase.

The same might be said of buttermilk, sour milk, or malted milk which may be taken in the event that milk disagrees. There is less bloating, sour stomach and other symptoms commonly complained of by persons who cannot take milk. Moreover, sour milk and buttermilk contain lactic acid bacilli, germs which are capable of combatting the harmful microbes found in the intestines.

Cream is well tolerated by some persons and poorly by others. When cream agrees and a pint or more can be taken daily, it is a splendid asset to the dietary in those requiring an increase in weight. Cream may be taken alone, or mixed with equal parts of milk, or with stewed fruits and other substances. Sour cream is likewise useful and is frequently digested much more easily than sweet cream. It may be taken a saucerful at a time and eaten with cheese, bread, crackers, or cookies.

WHAT TO AVOID.

What not to eat and drink has already been implied. To summarize, the following substances should be avoided: An excess of flesh foods; delicatessen and canned goods (except canned fruits); all spiced cheese; hot breads and rich pastries; under-ripe bananas and under-ripe fruit of all sorts; strawberries, blackberries, huckleberries, raspberries, watermelon; the condiments and spices already mentioned including vinegar, sour pickles and sour tomatoes; tea, coffee and other caffeine-containing beverages; alcoholic substances and an excess of carbonated beverages; candy in excess.

WHEN TO EAT.

When to eat may appear a superfluous subject, but if it is noted that many digestive ailments with consequent deleterious effects upon general health depend upon irregularity of eating, it is evident that some education of a percentage of humanity is necessary in this connection. Though ordinarily one eats three meals a day, this is not the rule with many of us who are either working too hard, playing too hard, or who are simply careless. The school child or college student frequently arises too late to partake of an ample breakfast, and bolts down a mere semblance of a meal or takes nothing at all in an effort to arrive in the class room on time. Lunch is disposed of in the limited time allowed and in not too ample a quantity or wholesome a quality. Such abuse of the appetite and the digestive organs, combined with the fatigue of the day's activities, renders the third meal a task rather than a pleasure. This habit is acquired by many business men and women and many professional men, especially physicians. The housewife, too, obsessed with the idea that household cares and attention to her children require every minute of her conscious existence, frequently permits herself to become a complete wreck through neglect of regularity of eating. Even the society "butterfly" living the vicarious existence of arising too late for breakfast and going to bed late enough to say good-morning to the milkman, is apt to suffer serious ill health as a result.

The taking of three meals a day should be the rule in those whose weight is not excessive. And these

meals should not only be properly balanced in ingredients, but also in quantity, and taken *regularly*. The same hour should be devoted to breakfast each day, the same to lunch, and the same to dinner, each to be separated from the preceding by five or six hours' interval. This permits of the maintenance of a healthy appetite wherewith one can enjoy eating; it permits of the proper functioning of the digestive organs and encourages proper elimination, thus overcoming the necessity for the use of laxatives. The regular eater is one whose life is so well ordered as to leave little time for digestive disorders.

HOW TO EAT.

If you have ever observed and meditated over a crowd of humans eating during a busy hour in a restaurant, you have probably concluded that few people eat properly. Aside from odd mixtures of food which alone lead you to marvel at the amount of punishment the digestive organs can take and still function, the speed with which food is bolted down is astonishing. We must eat slowly. The tendency to swallow a meal as though there is but a minute or two to catch a train is productive of many of the digestive disorders commonly complained of. Starches are digested in the mouth through the action of the saliva, hence adequate time must be taken in chewing the food. When this is done and the converted starches reach the stomach, this organ is not overstrained in its function, and digestion proceeds satisfactorily.

EAT CALMLY AND SMILE.

The mental condition of the individual while eating plays an important rôle in the success of the meal. Anxiety, anger, fear, general nervousness and the like obtund the appetite, retard digestion and lead to gastrointestinal disorders. The same is true of frequent disturbances during meal time by telephone, door bell, or unruly children. During meal time the mind must be calm and the period spent in eating must be uninterrupted and of sufficient duration—a half hour or more. Pleasant company, funny stories, music and a general air of carefreedom and levity make for a healthy digestion and maximum benefit from food consumed.

HOW MUCH TO EAT.

How much to eat is a current topic everywhere. With fat people trying to reduce, and unfortunate sensible thin people trying to appear well, and the "flapper" all but consumptive in appearance, to say nothing of the numerous articles in newspapers and magazines on diabetes, warning the readers to eat "just right," the impressionable layman is in a torrent of well- and ill-given advice more confusing than useful. Though we are here concerned largely with diet as it is related to the thyroid gland, what is stated may be regarded of use in the interests of general health, since the thyroid can be kept in a normal state only when the entire individual approaches the normal.

Weight standards posted over public scales are frequently erroneous because in a large percentage of

individuals these figures are not applicable. Anatomical peculiarities and tendencies require individual weight standards. Unduly broad-boned or long-boned persons, the "chesty," the athletic, and other conceivable types must have an avoirdupois at variance with printed standards. It is always best to rely not on fads or individual desires, but on good sense as to what should be your weight, with your physician to assist you in your conclusion.

For some whose weight and height rightly conform to the printed stardards, with age and sex taken into account, an increase of approximately 5 per cent. may be desirable to represent not fat, but reserve energy which may be relied upon in emergencies. Such persons must not reduce.

IF YOU MUST REDUCE WEIGHT.

If, however, you really weigh too much and your physician has confirmed this opinion, a reduction to a more satisfactory figure is not difficult in the average case. All you require is a reduction in your daily food allowance, with or without a change in quality and quantity of exercise depending upon your physician's views in your case. You might argue that you are already a small eater, but "small" in this connection is an elastic term and an inventory of what you eat may reveal that you are really eating more than you believe you do, and more than you need. We all know many stout people, confessedly small eaters, who not only dispose of a fair-sized meal three times a day, but nibble at a half-pound or more of candy and other goodies for good measure.

A certain percentage of stout people, with or without goiter, are suffering with deficiency of thyroid secretion. If you suspect that you are one of these, resist the temptation to try the numerous quack reducing remedies or to purchase thyroid tablets over the druggist's counter, for you may rue the day. Consult your physician, and he will make a basal metabolism test and other observations in the interests of accuracy of diagnosis and of treatment.

In a general way, were I to require a reduction of fifteen or twenty pounds, I should place myself upon the following dietary regime:

Breakfast.

Orange juice or grapefruit.
Slice of toast or 2 or 3 crackers.
Skimmed milk, Postum, or other coffee substitute.

Lunch.

Small potato in any form or one potato fritter.
Green vegetables in season, moderate quantity.
Saltines, not more than three.
Stewed peaches, pears, prunes, cherries or apricots, one-half adult share.
Milk, buttermilk or Postum.

Dinner.

Soup made of milk or beef, chicken or lamb broth containing rice, noodles, vegetables, peas, beans, corn.
An egg in any form, or one-half adult share of fish, fowl or lamb.
Pudding made of bread, rice, etc., not exceeding one ounce, or ice cream in the same quantity.
Beverage as at breakfast or lunch time.

Remarks: Do not eat between meals, and do not exceed three glasses of water per day.

The above diet list will result in a reduction of five to fifteen pounds per month, a process gradual enough to avoid lowering of vitality. The desire for more food than that above mentioned will be rather strong and difficult to overcome, but an adjustment

Fig. 12.—The first picture is that of a young woman with myxedematous (hypothyroid) obesity. Note the dull expression and bloated appearance. The second picture represents the same young woman eight weeks after the institution of medicinal and dietetic treatment. There is a reduction of forty-five pounds in weight. Note the bright expression and disappearance of bloating.

occurs in the course of a few days, following which all is well. Having reduced the weight to the figure in mind, a gradual increase of the above dietary can now be instituted, beginning with a little more bread, an increase in milk, as well as in fruits and vegetables. If the weight is observed twice a week, em-

ploying the same scales, with the same clothes, at the same time of day, the desired figure can be made permanent by an adjustment in the dietary.

IF YOU MUST GAIN WEIGHT.

The diet in thin people, with or without goiter, should be one of increased quantity of the already discussed permissible foods. There is a form of goiter due to subnutrition; it is accompanied by anemia, weakness, nervousness, palpitation, poor sleep, constipation, and general physical and mental unfitness, all of which resemble the symptoms of hyperthyroidism. The goiter is not large; it is a moderate swelling conforming to the shape of the normal thyroid gland, and is not a tumor. The correction of the dietary errors, the taking of added rest and sleep, and the prescribing of appropriate medicines by a physician constitute the treatment which yields recovery.

Young girls are often victims of the above condition, but the majority of sufferers are settled young matrons who are unnecessarily martyrs to manifold household cares, depriving themselves of fresh air, recreation, appetite, proper food, and healthy spirits, all because of their misconception of the definition of the term "housewife."

Speaking of young girls brings us to the subject of the "flapper" tendency of today. For fear that they might get fat, they eat too little and stay thin and consumptive-looking. What these youngsters find in remaining thin, weak and anemic-looking, when

they could with less effort be good-looking and healthy, is a mystery. Not alone do the general health and efficiency suffer, but the thyroid gland stands out prominently in bold relief and frequently undergoes actual enlargement and toxicity.

The food intake in undernourishment with or without goiter must be increased to a variable extent,

Fig. 13.—Example of case of apparent goiter from marked undernutrition, and result of treatment of the individual with gain of over 40 pounds in weight, and enjoyment of unprecedented health.

often to double the customary quantity. The habitual amount of food taken by these persons is surprisingly small. Little or no bread is taken, and the really acceptable foods are well mixed with spices and condiments, including dill pickles, mustard, and the like, occasionally drowned in several cups of coffee a day. That this requires immediate correction need not be argued.

Often when an ample dietary is outlined for a young woman who appears thin enough to break in two, the following almost hysterical objection is voiced: "Doctor, I don't want to get *too* fat; it would make me look horrid. Please, please don't let me get too fat!" Now, has a single word been said about the advisability of becoming *fat* or *too* fat? We are not advocating extremes, and we are opposed to either tendency. Indeed, a person too thin is hardly in danger of becoming fat. What we want is a happy medium, a safe means between extremes; what we want is normality.

Again, I often hear the remark: "Doctor, it is not my nature to gain; I have been thin all my life, and my mother is thin, and my aunt is thin; we are all thin." The response is: "There is a first time for everything, for being born, for getting measles, for normal weight and for being healthy." Only the anatomical freak is incapable of gaining sufficient weight to become normal. As for age, little difference is experienced in the task whether the subject is 16 or 66. I have in my records the histories of quite a few grandmothers who underwent the fattening process and reached the safe normal weight for the first time in their lives in the brief period of a few months.

Again, I hear this objection: "But, doctor, when I put on a few pounds it all goes to my limbs," or "it all goes to my chest," or "it all goes to my abdomen," or "it all goes to my face, and I look terribly fat." Nature is exacting, and if you are born with a tendency to have added weight go first to one place rather

than be evenly distributed, you must accept it. Having reached one part of the body first, whether the limbs, chest, abdomen or face, the additional avoirdupois required will probably distribute itself fairly evenly enough to satisfy your vanity. The fact remains that when you reach the normal weight, whether primarily evenly distributed or otherwise, you will, for the first time in your life, feel, act, and think more normally than ever.

The physical discomfort of forced feeding is often an obstacle to expediency of results. Since the appetite is lacking, the stomach shrunken and weak from disuse, and the bowels, because of habitual deficiency of residue entering them, are chronically constipated, we have problems facing us which require a physician's assistance.

After a few weeks of struggle with a quantity of food at first considered impossible, the individual finds it less difficult to tolerate a 25 per cent. increase over the former intake. The process of education, mental and physical, is now well under way, and a further increase in food intake is not as provocative of discomfort. Continued improvement in health renders it possible to take still more food, and the time soon arrives when a really satisfactory food intake is accepted by mind and body without protest.

The battle is won. For a while the patient has had to eat mechanically without an appetite; but now, with the necessary adjustment of food intake, a process which ordinarily requires three to five months to accomplish, the welcome sensation of hunger appears, becomes strongly established, and ample food

is taken willingly and pleasurably. The formerly emaciated, anemic, sick looking, possibly goitrous individual now beams with health.

DIET FOR INCREASING WEIGHT.[1]

Breakfast (7 to 7.30 A.M.).

Fruit, cereal, eggs, plenty of bread and butter, beverage.

Extra Nourishment (10 A.M.).

Lunch (about 1 P.M.).

Vegetables, soups made with milk as a basis, plenty of bread with butter or jelly, stewed fruit, beverage.

Extra Nourishment (4 P.M.).

Dinner (7 P.M.).

Small quantity chicken, lamb, or fish every other day; on other days, eggs in any form desired; soups, bread and butter, fresh cream or cottage cheese with sweet or sour cream, fritters, desserts, beverage.

Extra Nourishment (9.30 P.M.).

By an extra nourishment is meant one of the following suggested combinations:

(*a*) Two tumblerfuls of milk, hot or cold.

(*b*) Two tumblerfuls equal parts of milk and cream mixture (with a little vanilla and seltzer, if desired).

(*c*) Two raw or soft boiled eggs and a tumblerful of milk.

(*d*) Two or three eggs and a teaspoonful of sugar beaten thoroughly into orange juice.

[1] This diet list is modified from that contained in my book on goiter, intended for physicians, published by the Macmillan Co., New York.

(*e*) Milk toast. (Several slices of bread or toast dipped into a bowlful of milk.)

(*f*) One tumblerful of cream (with vanilla, sugar and seltzer, if desired).

(*g*) Fresh vanilla or chocolate ice cream, eaten slowly, with cookies or crackers, once daily.

THE DIET IN EXOPHTHALMIC GOITER.

What has been said above with respect to eating in general and forced feeding in particular is applicable to exophthalmic goiter. Since in this disease the appetite is usually voracious and the food intake is often ample, it may appear surprising that most of these patients are emaciated, but the reason is clear when we recall the fact that the food serves as fuel to supply the conflagration of the disease rather than the needs of the body. In other words, were the patient to take a small rather than an ample quantity of food, the emaciation would be even more marked. This is due to the high basal metabolism characterizing the illness—an implication of a pathologically excessive draft played upon life's furnace. The draft is constant, and unless fuel is supplied in the form of large quantities of food the body itself will soon be consumed by the disease. Hence it is that though the patient with exophthalmic goiter may be taking a normal quantity of food, a marked increase beyond this must be attempted as a condition of recovery.

With this end in view it should be stated that the quantity of food required during the active stage of exophthalmic goiter is about twice as much as the

quantity required by a normal healthy person. If the normal caloric intake for a person in good health of the same sex, age and height as the patient in question is 2500 to 3000 units daily, the sufferer from exophthalmic goiter should endeavor to consume 5000 to 6000 caloric units until the necessary weight is reached.

Though the appetite in a sufferer from exophthalmic goiter may be good, it is unsustained and easily satisfied. In the interests of cooperation the patient must disregard the appetite as guide and consider eating an imperative duty.

BREAD AN ASSET IN GAINING WEIGHT.

In the process of gaining weight the quantity of bread taken is of primary importance. I find that a 12 ounce loaf daily assists very materially in gaining, this quantity to be divided into twelve one-ounce slices, four slices to be taken at each meal. The four-slices-per-meal habit is the speediest way of reaching the necessary weight, and unless this is done the weight question will require many months, perhaps years before it is solved. The kind of bread advocated is unimportant. While whole-wheat bread is probably the best, ordinary white bread or rye bread may be taken if desired. If there is an aversion to the taking of bread this must be overcome immediately. Rolls, muffins and the like may be taken weight for weight instead of bread part of the time. The same may be said of cookies and crackers.

Those who suffer with nausea, vomiting and intestinal disturbances, especially diarrhea, must keep

in close touch with the doctor. An understanding physician usually succeeds in correcting digestive disturbances within a few weeks, following which the necessary quantity of food is taken and the patient is soon on the way to recovery.

WEIGHT AN INDEX TO PROGRESS.

The best sign in the world that the patient is progressing nicely is a material increase in weight.[1] A gain of approximately a half pound a day or three or four pounds a week is a good sign which indicates that progress is satisfactory. A gain of six or eight pounds during the first two weeks is usually associated with a reduction in the pulse rate by from 10 to 30 per minute, with corresponding diminution in distress about the heart. The facial expression becomes less anxious; there is an increase of confidence, of oncoming strength and vigor. A continuation of this progress means a restoration of weight to normal within from 12 to 20 weeks, and a further increase can be expected, reaching to approximately 5 per cent. above normal, the desired figure. When this is reached there usually is a restoration of the basal metabolism and pulse rate to normal with recovery from exophthalmic goiter.

Alone, the proper diet is incapable of curing exophthalmic goiter; it is a constituent of a harmonious

[1] It is noteworthy that those who have a moderately generous padding of fatty tissue are calmer, more jovial and less liable to nervous disorders than are individuals who lack weight. Fat appears to exercise a calming, soothing, tranquilizing effect upon the nervous system.

whole in treatment. The combination of proper eating, resting, medication, and mental adjustment, with the physician as advisor, guide, and friend, leads to a restoration of the individual to perfect health and happiness.

CHAPTER XVII.

SLEEP AND THE THYROID.

EFFECT OF SLEEP ON THE THYROID GLAND.

Sleep is a stabilizer of the thyroid. Take a normal quantity of sleep—enough to rest you completely, and you favor normality of thyroid function. Sleep too much and your thyroid, too, becomes sluggish, as evidenced by a letting down of physical and mental functions with reduction in efficiency. Sleep too little and you stimulate your thyroid to undue activity; this abnormality may become a habit, with resulting hyperthyroidism and its disastrous consequences. Hence a proper equilibrium between rest and activity is one of the most important assets to the maintenance of a normal thyroid gland.

EFFECT OF THE THYROID GLAND ON SLEEP.

A thyroid gland in normal function assists in normality of sleep. The closer to zero the basal metabolic rate the more likely the individual is to enjoy normal quantity and quality of sleep. An abnormally functioning thyroid gland effects sleep markedly. In the presence of lessened thyroid secretion physical and mental processes are sluggish. Thus in cretinism and in myxedema the individual presents a sort of lethargic or drowsy expression during waking hours. It is not unusual for such an individual to sleep through ten or twelve hours or even longer without waking.

On the other hand, in instances of hyperthyroidism, with or without exophthalmic goiter, sleep is short and restless. Subjects of exophthalmic goiter complain bitterly of poor sleep. Prior to the frank manifestations of the disease the patient discovers that sleep is not refreshing. On arising it requires two or three hours to rouse the energies in sufficient degree to permit of the performance of normal duties. As the disease asserts itself, sleep is more restless and fatigue becomes marked. Indeed, many patients claim they do not sleep at all and would rather not retire. Palpitation, throbbing of the blood-vessels of the head and neck, trembling, sweating, occasionally irritation of the intestines and of the bladder, the inability to quiet the thoughts which crowd upon the mind in the stillness of the night, and at times a most distressing itching of the skin—these are some of the reasons why exophthalmic goiter patients sleep poorly or not at all. Restoration of sleep to normal is one of the best signs of substantial progress toward health, and is an index of approaching recovery. It must be emphasized that in exophthalmic goiter the thyroid gland is not the sole factor in the cause of sleeplessness.

HOW MUCH SHOULD WE SLEEP?

The quantity of sleep required by a person in good health has been a topic for discussion through the ages. It depends upon the individual's age, physical and mental development, vocation and avocation, and personal peculiarities and idiosyncrasies.

From the time of adolescence onward, to and including middle life, many rules have been promulgated with regard to how much sleep should be had. Let us examine some of them:

Eight hours for sleep, eight hours for work, eight hours for play.

Eight hours for sleep, eight hours for work, eight hours for prayer.

Six hours for a man, seven for a woman, eight for a fool.

Retire with the birds and wake up with them.

Sleep until you feel you've had enough.

It has often been said that the quantity of sleep required by a healthy adult is in direct proportion to the amount of physical exertion demanded by daily duties, and in inverse proportion to his mental activity. In other words, the more one's life's task calls for much brain work and little exercise, the less sleep is required. Although many exceptions might be cited, this rule seems to hold true.[1]

[1] In this connection it is interesting to note the following comments from well known individuals, received by the author in personal communications: *Thomas A. Edison*: "Up to the sixtieth year of life four hours of sleep daily sufficed; since then I require six hours. Sleep is a matter of habit; if the will is powerful the time can be diminished. Nature will then compensate by making the sleep more profound and dreamless." *General W. W. Atterbury*: "I find seven or eight hours of sleep quite sufficient and have no difficulty in falling asleep. In order to sleep soundly and satisfactorily you must take no work home with you at night and let nothing worry you." *Dr. Harry Emerson Fosdick*: "I find eight hours the necessary period of sleep. I have no difficulty in falling aleep and recommend pleasant thoughts or prayer as a means of overcoming insomnia." *Dr. Stephen S. Wise*: "I concentrate in the matter of sleep as I do in the matter of work during the day. I sleep more in an hour than most people do. That is why during a lifetime I have been able to get along with only five or six

In the presence of thyroid excitability, be it ever so mild, the quantity of sleep must be increased by one or more hours daily, depending upon the physician's advice.

A factor strongly controlling the quantity of sleep is its depth. Was the sleep sound and did you arise feeling refreshed and strong? Five hours' sound sleep—a sleep in which you are "dead to the world" —is far more capable of restoration of body and mind to normal function than a ten hours' period of restlessness and tossing in bed with an occasional nightmare. Absolute rest presupposes a dreamless slumber, and the result obtained is a desire to arise and be up and doing—a feeling that the capacity for work has never been greater.

SLEEPLESSNESS.

The emotions play their part in the production of sleeplessness. Often in sensitive persons (and those

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hours of sleep daily." *Professor John Erskine*: "I think I enjoy rather unusual health, and unless I am overtired, I have occasion to give very little thought to the subject." *Dr. Will Durant*: "I require nine hours of sleep or rather I should call it nine hours of lying in bed because I have great difficulty in falling asleep. I have found no ways of overcoming this except those which would be more nuisance than the evil itself." *Howard Chandler Christy* advises those suffering with insomnia to stop thinking when they go to bed; mind or thought can be turned off like a spigot. *Clarence S. Darrow* says that eight hours of sleep were necessary formerly, but now six hours are sufficient. Reading in bed overcomes any difficulty should insomnia arise. *Fannie Hurst* (*Mrs. Jacques Danielson*): "I rarely, if ever, feel the need for more than five or six hours sleep out of twenty-four, usually five. A fine vitality has always been one of my assets and an ability to sleep little, but sleep that little fast and hard." *Dorothy Dix* (*Mrs. E. M. Gilmer*): "I find it necessary to have at least eight hours sleep at night. I cannot have less and maintain my level of efficiency."

susceptible to or suffering from exophthalmic goiter are unduly sensitive) a mere slip of the tongue or inadvertent slur or error in judgment or action on the part of a relative, friend, or even a stranger, is grossly exaggerated and dilated upon in the stillness of the night, and sleep is forfeited. Worry, depressing enough in itself, becomes a potent cause of sleeplessness.

How to overcome sleeplessness has been an age-long problem. Since insomnia is not a disease but merely a symptom, the first step in its cure is to discover and eliminate the cause. If the intestinal function is sluggish, the cure is obvious; if it is worriment or other mental excitation, reasoning and inhibition of impulses must be sought; if it is some form of disease the advice of a physician should be sought. In exophthalmic goiter the physician must be consulted early, and everything must subserve complete cooperation in the carrying out of his orders. Teamwork as a rule yields success. Under no circumstances must the individual yield to the temptation of self-drugging. If medicines are really necessary, these must be prescribed by the physician. Exhilarating yet soothing atmospheric and social environment is an essential asset in this connection.[1]

[1] I find the following a good formula for insomnia: The main cause of the average case of insomnia is the presence of a vivid, persistent stream of thought when it should lie dormant. There is a long line of mental objects, like soldiers in single file ready to march into active attention. The first image enters consciousness, remains its period of time, to be replaced by the next. This is followed by another and still another, and so on indefinitely during precious hours which should be devoted to sleep. Now, any single thought can be dispersed by well directed effort. If, for instance, you are thinking about the hero of the

A satisfactory period of sound, refreshing sleep every night is an evidence of healthy thyroid function.

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novel you read, you can easily dismiss him from consciousness. Another thought replaces this, which may concern itself with tomorrow's appointment with the dentist. This, too, is dispersed by the will. The succession of voluntary dismissal of thought images may continue for fifteen to thirty minutes, each thought becoming less vivid than the preceding, until the process has so fatigued the mind and the thought images have become so indistinct as to be non-existent. Since absence of active thought is synonymous with unconsciousnes, you are now asleep.

CHAPTER XVIII.

THINKING AND THE THYROID.

If the phlegmatic temperament were the rule—if worry, excitement, emotionalism, fear, were unknown, exophthalmic goiter and related disorders would be non-existent. Mental peace and poise are most desirable assets in the safeguarding of normality of thyroid and nervous function. Mental equanimity is possible only by the exercise of logical reasoning and a wholesome sense of humor.

REASONING *VERSUS* EXCITEMENT.

The best cure for excitement is reasoning. Worriment and emotionalism are the sand, while reasoning is the lubrication in life's machinery. This may be expressed in the following outline:

THE A B C OF MENTAL HEALTH.

A. EMOTIONALISM OR EXCITEMENT
- Anger
- Fear
- Worry
- Suspicion

IS OVERCOME BY

B. REASONING OR SELF-DISCIPLINE
- Restraint
- Forbearance
- Fairness
- Faith

RESULTING IN

C. HAPPINESS TO SELF AND OTHERS
- Sympathy
- Peace
- Poise
- Health

KEEPING COOL.

Emotionalism is a state of mental excitement. Excitement may be brought on by fear, anger, hatred, worry, jealousy, and other kinds of mental activity closely allied to or synonymous with instincts.

The greater the degree of sound reasoning, the more satisfactorily are emotions tempered and curbed. The *threshold of emotional reaction* is the time elapsing between the occurrence of a mental stimulus and the evidences of the reactional emotionalism. This time is the period during which the reasoning processes step in and coolly suggest your mode of thinking and acting. An ample threshold makes the cool thinker, and *vice versa*. Take for instance the example of a man who has been falsely called a thief. He knows very well that he is honest, hence his first impulse is to strike his opponent. If the emotional threshold is subnormal, a splendid fistic combat will result and the innocent one may be the loser. If, on the other hand, the offended man reasons thus: "This fellow called me a thief; *he* is a scoundrel; he knows I am honest; he called me a thief because of his lowly character. He is thoroughly beneath me as a man; were he not—were he my equal, I should strike him. But were he my equal he would not have called me a thief. This man is not my equal; why waste time in argument or combat? Why besmirch my character and risk my reputation by the possible publicity from a combat with an inferior individual?" This reflection leads the offended one to cool off, since the evaluation of his opponent's character belittled the insult to *nil*. This process of reasoning,

because of an ample threshold of emotional reaction, may be applied to almost all incidents otherwise capable of engendering excitement.

THE THRALLDOM OF WORRY AND FEAR.

A Chinese proverb says: "The legs of the stork are long, the legs of the duck are short; you cannot make the stork's legs short and the duck's legs long; why worry?" Some fear and worry about everything, hesitate, and are lost. The opportunity to go abroad is rejected for fear that the ship might sink. The fact that there are fewer accidents with modern steamers than on our busy streets is put aside as nonsensical. A trip across the English Channel by airship is regarded as insane, despite the fact that thousands make the trip in this fashion in perfect ease and with unbounded pleasure. A good business venture is turned down without an open-minded analysis, and the fact that there is but one chance in twenty to fail is regarded as too great a risk. Thus the opportunity for an ample income is lost. We might go on indefinitely pointing out the mechanism of morbid fear and worry and its resultant indecision and loss of advantages and pleasures. The individual is so busy worrying and fearing and destructively "emoting" that no time is left for analytical reasoning.

We fear poverty, we fear accidents, we fear illness, we fear eternity. We lack confidence in self, in our fellows and in God. The elimination of fear and the substitution of confidence would soon lead to a most healthy-minded and healthy-bodied stock of human

beings with an accompanying exaltation of accomplishments and happiness. A healthy belief in self, a broad faith in our fellows and a sane trust in the Almighty yield a length, a breadth and a depth of life that leaves nothing to be desired.

Fear is especially apt to assert itself during sickness. Will I die? Is there a hereafter? If so, where do I go, to Heaven or to Hell? Does the doctor know what he is doing for me? Is the medicine I take making me worse? Won't my business go to the dogs while I am sick in bed? *What is life anyway?* The human question mark, especially if he is also a "doubting Thomas" is a difficult patient to manage. We do not know God's purpose in creating us. But we are sure we want life, health and happiness. This is possible only in proportion with our ability to supplant for destructive fear and worry an enlightening reason and faith.

Remaining calm is as habitual as getting excited. Each becomes ingrained into personality through repetition. Whether you are seven years old or seventy, you *can* learn new tricks and school yourself in the art and science of repression, self-control, inhibition. As William James puts it: "Refuse to express an emotion and it dies; count ten before venting your anger, and its occasion appears ridiculous." In an emergency, whistle and keep up your courage, and the difficulty is overcome with flying colors. Keep the corners of your mouth turned up, and soon, by contagion from your exterior, your interior will likewise smile. Habits make us and habits

break us; let us select a proper and laudable bundle of habits with which to meet life's problems.

Merely to advise someone not to worry is, as Walton[1] says, like advising one not to walk awkwardly who has never learned to walk otherwise. The doctor must, first of all, practice a sensible philosophy of life himself, and then, instead of preaching, take the worrier into his confidence and assist him in an *analysis* of worry and its cure. Analysis naturally leads to a concentration upon its remedies and is the best means of "learning to walk" in a manner conducive to happiness to self and others. Above all, during this process of analysis we must agree with Herbert Spencer that "in all things good there is some evil, and in all things evil there is some good."

NEVER SAY "I'LL TRY."

When ordered to change your diet, or to go to bed early, or to stop taking tea or coffee, or to stop smoking, or to be reasonable, the worst thing you can do is to say: "I'll try." Trying is effort and effort is painful and pain is usually shirked, and so you are back again where you started. Instead, say: "I will," and you will find obedience a painless procedure. In this manner the tea habit, the coffee habit, the tobacco habit, the late-to-bed habit, the worrying habit, and all habits which your physician finds to be detrimental are overcome at once and without need for tapering off and without so-called shock. By this process the most inveterate coffee

[1] G. W. Walton: Why Worry? J. B. Lippincott Co.

drunkards and tobacco habitués behave as though they never heard of coffee or tobacco. And of the many experiences of this sort, I have never seen a case of harm from the sudden discontinuance of a bad habit.

WORRY AND WORK.

Worry is apt to creep into the performance of our daily duties and result in physical and mental wear and threatened or actual thyroid disease. That work, and even hard work, is not the disturbing factor is pointed out by Edward Bok,[1] an eminent example of what hard work can accomplish. "Some people have an idea that hard work hurts and even kills a man;" remarks Mr. Bok; "it doesn't. Hard work never yet killed a man, nor hurt him. Worry kills, but not work. What is called overwork is nothing but overworry. The healthiest men are those who work the hardest. A man feels well after he has worked hard. He goes to bed at night with a healthy fatigue. There is nothing so satisfying to a man as a healthy, busy day—a day which at its close makes him feel glad that he was part of it. Hard work * * * is a healthy price which any man pays for success."

Ideally speaking, the work best suited to the individual is that in which he finds his greatest happiness. Most of us, however, find that our work falls somewhat short of the ideal. Unfortunately, we frequently come in contact with an individual whose work does not in any sense of the term cor-

[1] Edward Bok: Modern Eloquence, Vol. IV, p. 97, John D. Morris & Co.

respond to inherent capacities, though it may correspond to his desires. Many a doctor would make a good business man; many a business man a good doctor. There are ministers and lawyers who would have done better had they chosen other callings. A waiter or a barber has been known to become a virtuoso in an opera company.

It is thus apparent that we are not always steeped in the work to which we are best fitted. In many instances of exophthalmic goiter the exciting cause was the worry associated with the work in which the individual was engaged. Take for instance the case of a school teacher who was possessed with an overactive conscience, and who was trying to make model scholars out of an unruly class. She worked herself into a nervous breakdown in an effort to accomplish the impossible, and the outcome was an attack of exophthalmic goiter. The fact of the matter is that she should have chosen another calling.

ALL WORK AND NO PLAY.

Work without sufficient respite for play injures the mental processes and is detrimental to health. Some of us do not believe play and recreation important enough for serious thought.

On the other hand, too much devotion to amusement and play is just as harmful as too little. The individual who spends all evening and even the wee hours of the morning at the radio has gotten into a bad habit and will regret it in course of time. The movie "fan" who devotes evening after evening to

screen presentations becomes warped in judgment and in moral concepts. We might say the same of bridge "fans" and those who become habituated to dance halls, pool parlors and club rooms. Amusement and recreation should not interfere with your vocation in life but should fit you for your working duties.

If your work is essentially mental in nature, you should, in play, relax the mind and engage in such exercise as horseback riding, baseball playing, tennis, and other forms of play or recreation that entail more of physical than mental concentration. It is feasible, in this connection, to consult your physician as to the relative value, in your case, of physical and mental diversion, for the reverse of the suggestions above mentioned occasionally holds true, in which, for example, a brain worker will find his most pleasant recreation in mental work of an unusual variety. If your work entails physical exertion, chances are your play or recreation should be of a nature not drawing upon the bodily forces. Fishing, pool playing, chess, reading, attendance at the theatre or lectures, and other conceivable forms of pleasurable, more or less passive utilization of spare moments, are conducive to repair of nervous and physical structures and increased fitness for work.

PRECARIOUS AND VICARIOUS PLAY.

A jaded young man of 24, seeking a thrill while at an amusement resort, decided to go up in an aëroplane for a ten-minutes' excursion as the best

means of completing his afternoon's recreation. When he saw the earth receding from him as the plane was ascending, he became very much frightened, but was too proud to ask the pilot to excuse him and descend again. When finally he again reached *terra firma,* it was observed that he was so badly scared that the symptoms of exophthalmic goiter were already evident.

A young girl in an amusement park took a ride on a toboggan slide, and before the trip was completed she fell headlong from her seat and not only sustained physical injuries, but developed evidences of exophthalmic goiter which turned out to be a very severe form of the malady.

So-called joy-riding with its thrills and close shaves and accidents; drinking parties, with the taking of bootleg poisons and the breaking down of morals; jazz "music" with its accompanying dancing, which in comparison renders the dance of the savage tame, accompanied by equally uncivilized jazz thinking and acting; night club life, with its destructive influences upon body and mind; and the craving for gambling; all these *may* be classified under play and relaxation and recreation, but they do not on close analysis resemble anything but forces which diminish efficiency and abbreviate existence.

PLAY AND THE HOME.

Many unsympathetic attitudes and misunderstandings and even uncontrollable outbreaks of temper within the family, which are indeed exciting causes

of thyroid disease and other ailments, could be prevented and made impossible through the cementing, calming influence of mutual enjoyment of games and other forms of amusement. Instead of each member of the family seeking his own form of diversion, if a subtle beneficial influence of mutual relaxation and play were properly established, many homes would cease to be the infernos that they are, would cease to be the cause of heartache and nervous breakdown, and the members thereof would not have merely a bedroom to come back to at night, but a home to live in.

THE MOST RELAXING RECREATING FORCES.

These are a healthy religion, sleep, music and laughter.

Religion gives us that all-abiding confidence in present and future that overcomes all obstacles.

The recreating power of sleep is apparent to all who sleep the sleep of the just.

The power of music as a relaxing and recreating force is acclaimed alike by poets and philosophers and physicians.

Laughter and a healthy sense of humor, if indulged in by all, would make for universal peace and love—and what is more relaxing? Who has not seen the close relationship between a laughing disposition and a well-fed, carefree body? A healthy philosophy of life must include joviality of disposition, which, in turn, is a valuable asset to the prevention and cure of thyroid excitability.

"It is a good thing to start out a-laughing of a Monday, keep laughing Tuesday, Wednesday and Thursday, be careful how you spend Friday night, and then make Saturday the merriest day of the week. You will find plenty of company, for the world loves a happy man."

—Charles Battell Loomis.

APPENDIX.

A BRIEF DESCRIPTION OF OUR DUCTLESS GLANDS.

Since the ductless glands are as interrelated as the links in a chain, a work on the thyroid gland without reference to the other endocrine glands of the body would be incomplete. No ductless gland can be abnormal without some abnormality of the rest. Moreover, we must remember that the ductless glands are intimately related to the involuntary nervous system.[1] The heart action, digestive organs, functions of the skin, kidneys, liver, and even of the mind are affected in many ways by a disturbance of the ductless glands. So direct and marked is the relationship between these organs and the entire nervous system that the ductless glands have recently been termed "the glands regulating personality."[2]

WHAT IS A DUCTLESS GLAND?

A gland is an organ of the body whose duty it is to manufacture a substance of importance in the proper functioning of the body. The salivary glands

[1] The involuntary, autonomic or vegetative nervous system is that part of the nervous apparatus over which we have no voluntary control. Thus the function of the heart, the kidneys, digestive organs and skin is controlled by the involuntary nervous system.

[2] Louis Berman: The Glands Regulating Personality, Macmillan Co., New York.

are organs which manufacture and excrete saliva, a substance which serves to digest starchy foods. These are *duct* glands. The kidneys, through the urine, serve to excrete and eliminate poisons. These, too, are duct glands. The same is true of the liver. Duct glands are both secretory and excretory. Each duct gland presents a variable sized tube of exit for its secretion or excretion as the case may be.

We are here concerned, however, with glands which possess no duct but discharge their secretion directly into the circulating blood. These are known as *ductless* or *endocrine* glands, or *glands of internal secretion.*

Some glands appear to serve simultaneously as duct and ductless structures, manufacturing both an external and an internal secretion. The pancreas is such an organ. It sends its digestive juice into the intestine through a duct, while at the same time it manufactures a secretion called *insulin* within tiny areas of its anatomy known as the *islands of Langerhans.* Insulin is of vital importance in taking care of sugar metabolism in the body. The sex glands, otherwise known as the gonads, likewise possess an external and an internal secretion.

THE BEGINNING OF ENDOCRINOLOGY.

The ductless glands are vaguely mentioned in literature, dating back to hundreds of years before the Christian era. It was not, however, until 1855 that terms were definitely coined predicting future researches in this field. It was then that Claude

Bernard[1] employed the term "internal secretion," in contradistinction to external secretion. In 1889 Brown-Séquard,[2] then 72 years old, announced the results of experimentation upon himself with so-called interstitial glands,[3] and pointed out that this procedure markedly improved his physical and mental being and restored his vigor. This was the first so-called rejuvenating experiment in history.

Thus in a crude way began the science of endocrinology. Its evolution, however, was definitely begun in the year 1893, when Dr. Charles E. de M. Sajous presented to the world his monumental work entitled "The Internal Secretions and the Principles of Medicine."[4] Now for the first time in the history of the world, the ductless glands were discussed in a study tracing them from their origin to the current day of medical knowledge. This publication was so clear and prophetic in its practical applications that it stands today as the foremost work on the subject. Through his labors in this difficult and fascinating field, Dr. Sajous has rightly earned the title of *father of rational endocrinology.*

THE SOURCE OF PERSONALITY.

Through *endocrinology,* the science of the ductless or endocrine glands, we can now explain why one

[1] Claude Bernard: Compt. rend. Acad. d. Sc., Paris, 1857, *54,* 578, 1325.

[2] C. E. Brown-Séquard: (Quoted by Biedl) Internal Secretions, 1922.

[3] The interstitial glands consist of those tiny portions of the sex glands that possess an internal secretion.

[4] Charles E. de M. Sajous: The Internal Secretions and the Principles of Medicine, 2 vols., F. A. Davis Co.

person is a midget and another a giant; why one is fat and another lean; why one is underdeveloped and another overdeveloped; why one is stupid and another bright; why one is hairy and another smooth skinned; why one is dark complexioned and another fair; why one is hasty and excitable and another phlegmatic; and many other physical and mental peculiarities, common or rare, which serve to divide humanity into numerous types and beings. Indeed, all the physical and mental peculiarities determining our individuality are now believed to be regulated and controlled by our ductless glands.

HOW THE DUCTLESS GLANDS FUNCTION.

A ductless or endocrine gland performs its function through its secretion known technically as a *hormone* or chemical messenger which is taken up by the blood and carried to the organs or structures requiring it. The hormone of the thyroid gland, for instance, is concerned, among other things, with the physical and mental development of the body; the hormone of the adrenal gland is concerned, among other things, with the maintenance of blood-pressure, pigmentation of the skin, and with the protection of the individual during moments of peril. Each ductless gland not only has its own specific function, but is also concerned with depressing or exalting the functions of the other glands. Each manufactures a specific hormone which exerts its effects directly upon the tissues concerned or indirectly through its influence upon the involuntary nervous system.

THE MOST IMPORTANT DUCTLESS GLANDS.

The most important glands possessing an internal secretion are the thyroid gland, the parathyroid glands, the adrenal or suprarenal glands, the pituitary gland or hypophysis, the thymus gland, the islands of Langerhans areas of the pancreas, the pineal gland, and the sex glands otherwise known as the gonads. In addition, there are other structures in the body regarded by some as possessing an internal gland secretion, about which we know very little. Let us mention these for the sake of completion. The spleen, a large organ situated in the left side of the abdomen; the prostate gland, a part of the male sex organs the size of a chestnut; the carotid glands, two in number, one on each side of the neck, the size of a tiny pea, located at the bifurcation of the carotid artery; and the coccygeal gland located in relation with the coccyx. The kidneys, liver, duodenum, mammary glands, and other parts of the body are also said to possess ductless gland functions, but science has not yet been able definitely to confirm this.

THE THYROID GLAND.

A detailed description of the thyroid was given in the first chapter. Briefly, this organ is concerned with metabolism,[1] growth of body and mind, defense of the body against disease, equilibrium of the entire chain of endocrine organs, and other duties as yet partially understood. If absent in the infant, there

[1] A definition and description of metabolism was given in the first chapter.

results a state of perpetual infancy known as cretinism. If through disease or surgical operation the thyroid gland is deficient or absent in the adult, a condition known as myxedema or cachexia strumipriva respectively, occurs. If the thyroid secretes excessively, the symptoms of hyperthyroidism result. When the thyroid gland becomes enlarged we are faced with a goiter, the various types of which have been described.

THE PARATHYROID GLANDS.

The parathyroid glands are from two to four or more in number, usually four, situated behind the thyroid gland. Each is a tiny ovoid structure, somewhat flattened and smaller than a melon seed.

These glands regulate the quantity of calcium in the blood and tissues and render harmless a poison called *guanidin* which is apt to accumulate in the body.

Calcium is an element very important to life. It is not only vital to the growth of bones, but serves to maintain the stability of the nervous system. Moreover, without adequate calcium in the blood, wounds heal poorly, and blood clotting is hindered or checked, so that fatal hemorrhage may occur. *Rickets*, associated with softening and deformity of the bones, nervousness and convulsions, is due to insufficiency of parathyroid function. *Hemophilia,* a condition in which blood clotting is virtually reduced to *nil,* is the result of a deficiency of calcium in the blood through parathyroid deficiency, the sufferer being known as a bleeder. Indeed, such a person may

bleed to death from a minor operation, as for instance, the removal of the tonsils.

Prior to the time of improved thyroid surgery, the parathyroids were frequently injured and often entirely removed by thyroidectomy,[1] with consequences which often proved fatal, for there developed a disease known as *tetany* or *tetania parathyropriva.* This malady is characterized by muscular spasms somewhat resembling the results of strychnine poisoning or of lock-jaw. There is great excitability of the nervous system, a peculiar spasmodic contraction of the muscles of the hands and feet and of the rest of the body, and contortions of the face. *Parathyrin,* a recently discovered remedy derived from the parathyroids of animals completely controls this condition, saving the patient's life. Parathyrin will be discussed again later.

THE PITUITARY GLAND.

At the base of the skull, slightly behind the root of the nose, there is a small, gouged out, bony space, saddle-like in shape, just large enough to admit the tip of your little finger. This is known as the *sella turcica* or "Turkish saddle," and contains a tiny organ known as the pituitary gland or the hypophysis. This little structure is arbitrarily divisible into two parts—the anterior or front lobe, and the posterior or back lobe.

The two parts of the pituitary gland, connected by a kind of nerve structure, have distinct functions

[1] The operation of removing a part or the entire thyroid gland.

which are manifested through internal secretions or hormones. The known hormone of the anterior lobe is believed to be *tethelin* (Robertson); that of the posterior lobe is *pituitrin*. The functions of the anterior lobe are directed toward the regulation and growth of the skeleton, the development and function of the sex glands and the development of the secondary sexual characteristics.[1] The posterior lobe is concerned with the regulation of carbohydrate or starch metabolism; the contraction of the involuntary muscular structures of the body, especially of the intestines, blood-vessels, and uterus; the partial control of the kidney excretion; and the partial control of bodily temperature.

There have been entire volumes written upon the pituitary gland, and yet what is known of it is a fraction of what is still to be learned. As in the case of each of the other ductless glands, the pituitary functions are related to those of all other endocrines, more particularly the thyroid, the adrenals and the sex glands.

There are several schools of investigators presenting different views on pituitary function. Sajous insists that the pituitary is totally devoid of any function, and that any symptoms attributed to this gland are really to be ascribed to the nerve tissues about it; that when the pituitary is injured or presents a tumor growth, or is diseased in some other way, the symp-

[1] The superficial evidences characterizing sex, namely, the voice, appearance, bodily contour, distribution of hair, the characteristic mannerisms, and other distinguishing features of sex.

toms arising therefrom are not due to disturbances of this gland but to interference with the functions of its nerve tissue and of the *tuber cinereum.*[1] Canus and Roussy,[2] experimenting on dogs, concur with Sajous. On the other hand, Goetsch[3] and others, and Smith and Smith,[4] found that injections of anterior lobe of the pituitary accelerated the rate of growth of normal tadpoles to unusual size. Moreover, it was found that injections of anterior pituitary of animals as a treatment of individuals suffering with anterior pituitary disease, yielded startling results in early cases. Again, hypodermic injections of pituitrin not only increase contractions of the intestines and of the uterus, but are of marvelous efficacy in overcoming a condition known as diabetes insipidus.

Credit must be given Englebach and Tierney[5] for their splendid descriptions of pituitary disturbances, and I have borrowed freely from their writings on this gland.

Disturbed functions of the anterior or posterior part of the pituitary present symptoms of varying nature, and depend largely upon the age of the individual experiencing this disturbance.

Diminished function of the anterior pituitary occurring in a child results in undergrowth of all bones, short stature, hands about one-third smaller than

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[1] The tuber cinereum is a tiny eminence of gray matter at the base of the brain, in intimate relation with the pituitary.

[2] J. Canus and G. Roussy: Endocrinology, 1920, *4*, 507.

[3] Emil Goetsch: Johns Hopkins Hosp. Bull., 1916, *77*, 29.

[4] P. E. Smith and Irene P. Smith: Endocrinology, 1923, *7*, 579.

[5] W. Englebach and J. L. Tierney: Tice's Practice of Medicine, 1922, *8*, 342, 354, 413; W. Englebach: Endocrinology, 1920, *4*, 347.

normal for the age, a broad feminine type of pelvis, underdevelopment of sexual organs, absence of secondary sexual characteristics, marked retardation of mentality, subnormal temperature, slow pulse, and unduly low blood-pressure.

Diminished function of the anterior pituitary occurring in adults results in undergrowth only of short, flat bones, with tall or normal stature, small head, unusually small hands, and a pelvis of somewhat feminine type. The sexual glands are normal in appearance with a tendency toward deficiency of function; the secondary sexual characteristics are undisturbed. There is a tendency toward undue fatigue. The mentality is of the average, the temperature is below normal, and the blood-pressure is low.

Excessive function of the anterior pituitary occurring in children is associated with such excessive increase in height as to deserve the appellation of *gigantism.* The unduly tall, growing youngster, reaching a height of more than six feet, is one in whom the anterior pituitary is functioning a bit excessively. In extreme cases, the head is large, the hands are about one-third larger than normal, the pelvis is narrow and of masculine type, the sexual glands are large and well developed, the muscles are normal or overdeveloped with a tendency toward deficient endurance, and the mentality is apt to be apathetic. The temperature, pulse, and blood-pressure are normal.

Excessive function of the anterior pituitary in adults yields a kind of gigantism in directions other than height. There is an overgrowth of hands,

fingers, feet, and toes, and of the short and flat bones only, giving rise to the picture of the disease known as *acromegaly*. The head is large, the nose is blunt and rounded; the bones of the face, especially the cheek bones, are prominent; there is a blunt, rounded chin; and the lips become thick. The hands are large and spadelike, with wide wrist and broad, clubbed, sausage-shaped fingers. Such an individual may first be attracted to his or her illness by the fact that the customary sized stockings, shoes and gloves are becoming tight; soon it is discovered that several sizes larger are necessary. The pelvis is of masculine type; the sexual organs are large and well developed, and the female secondary sexual characteristics are apt to revert to those of the male. The voice becomes raucous. The muscular structures are overdeveloped, resembling the male in type. The mouth becomes large enough to accommodate the tremendously enlarged tongue, and the teeth are soon found to become somewhat separated because of the increase in size of the jaw bones. The mentality is more or less unstable, but is not in any way deficient, and the individual is apt to be rather talkative and temperamental. Weakness, headache and disturbances in vision are commonly complained of.

Deficient function of the posterior pituitary secretion results in a reduction in basal metabolism and an undue ability properly to assimilate starchy foods. There is also a peculiar kind of obesity characterized by a fatty girdle about the lower part of the abdomen. Excessive accumulations of fat occur also at the breasts. There is an excessive output of urine, intes-

tinal sluggishness, and a deficiency of function of the thyroid and adrenal glands. The sexual glands are likewise in a state of marked functional deficiency. The mind is apathetic, the pulse slow, and the temperature below normal.

Excessive function of the posterior pituitary secretion occasions an increase in basal metabolism, a tendency toward a weakened starch assimilation, with the formation of excessive quantities of sugar in the urine and blood. Instead of excessive fat, there is a tendency toward a loss in weight. There is an increase in the activity of the thyroid and adrenal glands. The sexual organs are apt to be overly active. There is also apt to be some mental instability. Though the temperature is normal, the pulse is usually rapid.

There are many points in common between disturbances in function of the thyroid gland and of the posterior pituitary. In deficient secretion of both, there is increased weight, diminished basal metabolism, an increased ability to take care of great quantities of starchy foods, slow pulse, tardy mentality, dry skin, subnormal temperature, deficient sexual function, and intestinal sluggishness. On the other hand, in increased secretion of the thyroid or the posterior pituitary there is diminished weight, an increased basal metabolism, a deficiency of ability properly to take care of starches, resulting in an excess of sugar in the urine and blood, rapid pulse, quickened mentality, moist skin, and intestinal overactivity.

Disturbances of both lobes or of the entire pituitary gland are probably the most common types of pituitary disturbances encountered.

Deficient functional activity of the entire pituitary gland gives rise to a condition known as Froehlich's disease or, as it is known in medical circles, *dystrophia adiposogenitalis*. This disease is characterized by obesity and general underdevelopment. The fat is particularly localized at the breasts, lower portion of the abdomen, hips, and upper portions of the thigh. The skin may be either of alabaster hue or of waxy appearance and is rather dry. The hands and feet are smaller than normal. If the disease has begun early in life, the stature is small; if late, the patient may be normal in height or even tall. If the disease is due to a tumor of the pituitary gland, such pressure symptoms as headache, nausea, vomiting, and disturbances of vision may occur. The sexual retardation involves both the primary and secondary characteristics. The sex organs are infantile, especially if the disease has developed before the age of puberty. In the male, the skin lacks the usual hair distribution, and the beard is scanty or absent. Also, the breasts are rather large, the pelvis broad, and there are other features which tend toward feminine characteristics. In the female, there is likewise a tendency toward reversal of sex characteristics; the skin is coarser than normal, with a tendency to hairiness, especially of the face; the breasts are smaller; the sex glands are very poorly developed and their function suppressed. Urinary disturbances are common. Mental backwardness,

subnormal temperature, low blood-pressure and slow pulse are common. Of course, as in other diseases of the ductless glands, there are early or borderline cases in which the diagnosis is doubtful; and there are cases in which the diagnosis is very difficult to make because of the peculiar combination of ductless gland involvement in which several of the glands vie with each other as to which can dominate in abnormality. There are also various types of the malady just described, as, for example, the "Lorain" and "Cushing" types, which we shall not discuss.

Excessive activity of the entire pituitary gland leads to gigantism if it occurs during the growing period of existence, or to acromegaly if it develops during adult life. Excessive fat accumulations are absent. Brissaud[1] calls attention to an intermediary condition which he terms "acromegalo-gigantism," occurring between the period of adolescence and adult life. It is to be remembered that most human giants are a combination of gigantism and acromegaly.

The pituitary gland is so directly concerned with skeletal growth that Williams[2] has aptly termed this organ the "dwarf and giant maker." The giants of the circus or museum, eight or nine feet tall, are instances of pituitary disease. Bassœ[3] aptly remarks that there are no "normal" giants, and that half of all reported giants have had acromegaly. In all cases of acromegaly there are very decided indica-

[1] E. Brissaud: Nouv. Icon. de la Salp., 1897, *10*, 240.
[2] E. H. Williams: How We Become Personalities, Bobbs Merill Co.
[3] B. Bassoe: Med. Clin. N. Amer., 1921, *5*, 85.

tions of marked disturbances of other ductless glands, especially the thyroid and the adrenals.

The present day knowledge of the ductless glands has enabled the endocrinologist to assist individuals suffering from pituitary disease to a marked degree, more especially if those persons are placed under treatment early. Of course, where a tumor of the pituitary gland is responsible for the difficulty, a very serious operation must be considered, if x-ray or radium treatment proves futile. Cushing[1] is probably the foremost pituitary surgeon and has to his credit a very satisfactory series of cases. In diseases of the pituitary gland not associated with tumor, medicine derived from ductless glands of animals is frequently of definite service. The determination of the precise nature of the disease, whether the condition is that of deficiency or excess of one or the other portion of the gland, is a prerequisite to success.

THE ADRENAL GLANDS.

The adrenal or suprarenal glands, two in number, are somewhat triangular in shape and situated in the abdomen, perched one on each kidney. They are about an eighth of an inch in thickness. Each adrenal contains an outer portion or *cortex* and an inner portion or *medulla*. The adrenal glands, especially the medulla, are vital to life's processes.

The adrenal cortex is thought to be concerned with the evolution of sexual characteristics and with the regulation or control of the color of the skin and

[1] H. Cushing: The Pituitary Body and Its Disorders, Lippincott.

hair. Indeed, some believe that racial color is controlled by the suprarenal cortex.

The adrenal medulla manufactures a hormone that is vital to life. This is called *epinephrin* or *adrenalin.* So powerful is this substance that it is contained in the circulation in the inconceivably small quantity of one part to one billion parts of blood. Adrenalin is concerned with muscular tonus, blood-pressure, and with an influence on the necessary equilibrium of the other ductless glands and of the involuntary nervous system.

Moreover, the adrenals, through the adrenalin, are said to be the organs of courage or of fear, of fight or of flight. That is, they are concerned directly with the mechanism of the instinct of self-preservation. During such emotions as fear, rage, or excitement, a greater quantity of adrenalin is sent out into the blood. This stimulates the involuntary nervous system and causes a discharge of a greater quantity of sugar from the liver into the blood. Simultaneously with this, there is a contraction of the blood-vessels of the liver, spleen, and other abdominal organs, which become relatively anemic in favor of a greater quantity of blood where it is most needed, namely, the brain, heart and limbs. This results in an alertness of the body, a tenseness of the muscles of the limbs, a clenching of the fists, prominence of the eyes, increase in heart rapidity and in the respiratory rate, and the individual is ready to decide at a moment's notice whether to fight or to flee. Without adrenalin this process would be impossible, and

emergencies of life could not be dealt with in accordance with biological laws.

Let us now see what happens when one or the other part or the whole of the adrenals becomes abnormal.

Increased secretion of the suprarenal cortex occurring in girls and women results in a condition of feminine pseudohermaphroditism, or as it is known in France, *virilism.* One might term such an individual a "man-woman" since there is the development of male characteristics in the female. The voice becomes masculine, there develops a growth of hair on the face and body, masculine mental qualities are observed and a varying degree of reversion of the sexual organs to that of the opposite sex occurs. The usual cause is a tumor of the adrenal cortex, though this need not be the case.

Increased secretion of the suprarenal cortex in the male merely intensifies the masculine characteristics. There is an unusual hairiness of the body and other features accentuating masculinity.

Tumors of the adrenal cortex in the newborn child likewise determine a condition of partial hermaphroditism, a woman being regarded as a man, and *vice versa.* In childhood this results in precocious or early puberty; a four year old girl may quickly develop into the semblance of a young woman of sixteen, and a six year old boy may quickly develop into the stature, including the acquisition of the primary and secondary sexual characteristics, of a man.

Diminished secretion of the adrenal cortex is an accompaniment of Addison's disease, to be mentioned

later. Discoloration of the skin and marked weakness are distinctive features.

Increased secretion of the adrenal medulla, resulting in increased adrenalin secretion, is thought to be responsible for certain forms of high blood-pressure.

Diminished function of the adrenal medulla with resulting deficiency of adrenalin secretion is associated with an unduly low blood-pressure, an abnormal tendency to fatigue, general weakness, inability to resist cold temperature, mental depression, and poor resistance to the usual ailments to which we are heir. Such individuals are quite prone to attacks of so-called nervous breakdown and neurasthenia.

Decreased secretion of the entire adrenal glands, if of severe degree, is incompatible with life. It results in a disease named after Thomas Addison,[1] an English physician, who was the first to give a detailed description of this malady. The usual cause of the disease is the destruction of the adrenals by tuberculosis. Fortunately, this condition is rare.

The most important symptoms associated with Addison's disease are vague pains in the stomach and limbs, an increasing weakness and flabbiness of the muscles, anemia, emaciation, extremely lowered blood-pressure, and a brownish-black discoloration of the skin which may cause the individual to resemble a negro. Despite efforts at treatment, such a patient usually succumbs within a period of from a few weeks to several months. Rarely, through the intensive, expert use of suprarenal feeding and injections of adrenalin, life may be prolonged for a year or two.

[1] Thomas Addison: Jour. Physiology, 1894, *16*, 1.

THE THYMUS GLAND.

The thymus is a copper-colored structure corresponding to the sweetbreads of the meat market. It is known as the organ of childhood since it is greatest in size during childhood years. It is situated in front of the windpipe, behind the breastbone, its lower extremity in relation with the base of the heart and its great blood-vessels.

Though no specific function for this gland has as yet been determined, it is believed to check the too rapid development of the individual, especially the sex glands. This is based on the fact that castration[1] in the animal causes shrinkage of the thymus, while removal of the thymus speeds up evolution into adult life, with precocious development of the sex glands.

Ordinarily the thymus gland disappears with the approach of puberty. If for some reason the thymus persists a condition recognized as *status thymolymphaticus* occurs. This is characterized by a somewhat feminine appearance of the individual. He is fair-featured, smooth-skinned, and unduly rosy-cheeked, with poor resistance to disease. Indeed, an infection or an anesthetic during a tonsil operation may be fatal. Such a person is very susceptible to exophthalmic goiter. It is believed by criminologists that a child who will lie and steal and deceive is frequently the victim of a persistent, large thymus gland. The adult with a large thymus is one in whom the emer-

[1] The surgical removal of the essential elements of the sexual apparatus.

gencies of life may be so enormously exaggerated as to cause sudden death from asphyxia.[1]

An excessive size of the thymus at birth may so interfere with breathing and heart action as to endanger life. The term "blue baby," though applied to a congenital heart condition, is sometimes used in application to just this type of infant. This baby, surviving, develops into the type of adolescent or adult just described. Thymus children are a class by themselves, offering an important problem to children specialists and endocrinologists.[2] Asthmatic attacks and other serious conditions are commonly observed. Fortunately, the thymus gland responds very readily to the shrinking influence of x-ray treatments, so that the little patient can be greatly benefited and his future safeguarded.

THE PINEAL GLAND.

The pineal gland, regarded by Descartes as the seat of the soul, is a tiny conical mass of tissue situated in the base of the skull cavity behind the pituitary gland. The nature of its secretion is unknown. In unison with the thymus, the pineal is a deterrent to undue bodily and sexual development. This is a deduction drawn from animal experimentation and from human beings in whom certain tumors of this gland resulted in freakish sexual precocity, with the development of symptoms resembling those attributed to suprarenal cortex disease. Thus a boy of four is

[1] Suffocation.

[2] Specialists in the science of ductless glands.

reported to have attained the development of a full-grown man within a few weeks, and a girl of four or five that of a fully developed woman. Intellectual development is also a function assigned to the pineal. It was discovered that feeding pineal gland of animals to certain types of mentally defective children resulted in marked benefit.

THE SEX GLANDS (GONADS).

The internal secretion of the sex glands exercises its influence upon growth, stature, vigor, and physical and mental potentiality and habits—indeed, upon practically everything in life, consciously and unconsciously. Human endeavors, accomplishments, aspirations in art, science, literature—indeed all fields characterizing human progress are, whether we know it or not, largely dominated over by our sex glands. The sex glands are, in turn, assisted in their dominance over the individual by interrelation with other ductless glands, especially the thyroid, pituitary, adrenals, thymus and pineal.

SEXUAL EPOCHS.

The development of secondary sexual characteristics marks distinctly the difference between male and female. Until then, the physical and mental traits of boy and girl are about alike. When the boy has reached his teens, hair appears on the face, the voice changes and becomes mannish, and muscles become harder and more prominent, and all the other evidences of masculinity assert themselves. There is an

awakening of initiative and ambition, and the mental trend is now in the direction of "up and doing" to make something of himself.

The girl reaches puberty two or three years earlier, and there occurs a gradual evolution in the opposite direction from that of a boy. The skin remains soft and smooth, the voice is treble, the breasts develop, the pelvis broadens, menstruation occurs, and she now becomes a young woman. The mental trend is toward romantic day dreams. The mothering of dolls now gives way to remote hopes of maternity, and a degree of coyness and shyness and reserve characterizes the individual. In the present day of equality of sexes, some female readers might object to my implications as to the marked difference of mental trends between the newly developed man and woman, but we must bear in mind that irrespective of artificial conditions and times, nature will have its way.

The menopause or climacteric in woman, occurring as a rule between the fortieth and fifty-fifth year, is associated with gradually decreasing menstrual and procreating functions to the point of complete cessation, sensations of heat and cold, at times nervous excitement and emotional and hysteroid attacks. This transient period of varying severity is followed by a satisfactory adjustment to life and its problems.

Men likewise go through a kind of menopause or climacteric. There is a failing of sexual life, a deficiency in physical and mental strength and initiative, hardening of the arteries, gray hair, and often a pas-

sive and unduly tolerant attitude toward life and things.

All this is believed to be due to a failure of function of the internal secretion of the sex glands, and upon this theory is based the rejuvenation procedures. We must insist, however, that old age can be considerably postponed by the culture of a youthful mind through self-discipline.

DOUBLE OR DOUBTFUL SEX (HERMAPHRODITISM).

True or pure hermaphroditism, in which an individual has the functioning organs of both sexes, almost never occurs. Hence this term applies itself to an individual who, though male, possesses the organs of both sexes, but *predominantly* those of the male, or, though female, possesses organs of both sexes, but *predominantly* those of the female. Thus arise the terms *male hermaphroditism* and *female hermaphroditism*. *Pseudohermaphroditism* is a condition in which in the same individual there are the sexual organs of one sex, but secondary sexual characteristics of the opposite.

Many gradations of these types of individuals abound in medical literature. Every now and then one reads in the newspapers of a man or woman who for many years has dressed and acted like a person of the opposite sex. Usually these are hermaphrodites. A hermaphrodite may even marry a person of the sex that predominates in his or her own being, or, more fortunately, the sex opposite to that which predom-

inates. Falta[1] cites quite a few instances in which these poor mortals were the victims of erring Nature. One was a 43 year old "woman," another a 20 year old "man." In one case, that of a 46 year old individual whose habits were those of a woman, marriage occurred at 21, and some time later it was discovered that she was approximately two-fifths male.

It is claimed by some writers that complete masculinity or complete feminity does not exist in Nature, but that each possesses a little of the opposite sex. Weininger,[2] for instance, is very positive on this matter. If this degree of the opposite in an individual is marked, the divergence becomes apparent, and a grade of hermaphroditism occurs.

EUNUCHISM.

Castration is the removal through accident, operation, or disease, of the essential or primary sexual organs. The individual having undergone castration is known as a *castrate.* This is the term usually applied to a female in whom the ovaries were removed. A male castrate is known as a *eunuch,* and the condition presented by a eunuch is known as *eunuchism.* This must not be confused with *eunuchoidism* which will be mentioned later.

Eunuchs were from the remotest antiquity employed to guard the women in the Orient, in Greece and elsewhere. Despite the notion that eunuchs are

[1] Wilhelm Falta: Endocrine Diseases (Trans. by M. K. Myers), P. Blakiston's Son & Co.

[2] Otto Weininger: Sex and Character, G. P. Putnam's Sons.

deficient in courage and mentality, many notable exceptions could be cited in which such persons have gained prominence in positions of public trust. Herodotus tells us that eunuchs in Persia were noted for their fidelity and were frequently promoted to high offices. "Narses, the famous general under Justinian, was a eunuch, as was Hernias, governor of Atarnia in Mysia, to whose names the great Aristotle offered sacrifices. * * * The hideous trade of castrating boys to be sold as eunuchs for Moslem harems has continued to modern times, the principal district whence they are taken being the inland of northeast Africa. * * * Even more vile, as being practiced among a civilized European nation, has been the Italian practice of castrating boys to prevent the natural development of the voice in order to train them as adult soprano singers, such as might till lately be heard in the Sistine Chapel. * * * Driven long ago from the Italian stage by public opinion, they remained the musical glory and moral shame of the papal choir till the accession of Pope Leo XIII, one of whose first acts was to get rid of them."[1]

There are some types of humanity who are so fearful of their inability to resist temptation and sin that they deem it a sacred duty to undergo the operation of castration. Basing their views on the texts Matt. xix 12, v. 28-30, this form of asceticism gave rise in the third century to a religious sect of eunuchs. Even now there is a sect called Skopzi in Russia which practices castration.

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[1] Encyclopedia Britannica, vol. viii, p. 667 (New Werner 20th Century Edition).

Castration as a punishment was advocated by Alfred the Great. Every now and then lawmakers advocate castration to protect the public morals. In modern times legislative enactments have been passed in the interests of eugenics, so that idiots, imbeciles and criminals might not propagate their kind.[1]

The physical results of castration in the male child are an underdevelopment of the secondary sexual characteristics, inability to attain the masculine voice, a tendency toward augmentation in height, and poor muscular growth. The bones are long and thin, while the pelvis is wider than normal; the skin is smooth, resembling that of the female, and there is little or no growth of hair on the face. The results of castration in an adult male are a tendency toward an increase of fat, the development of a high-pitched voice, a deficiency of physical and mental vigor (with the historical exceptions noted), a tendency toward scantiness of hair on the face, and, of course, an inability to procreate.

Castration in women (removal of the ovaries), is not associated with as marked results as in men. There follows an increase in weight, nervous and emotional excitement, headaches, sensations of cold and heat, and occasionally mental depression. These

[1] There are approximately fifteen states authorizing sterilization operations to prevent birth of children to feeble-minded, epileptic or criminally inclined persons. Last year (1927) Idaho's sterilization law went into effect. On May 2 1927, Associate Justice Oliver Wendell Holmes of the United States Supreme Court, in a ruling stating that "three generations of imbeciles are enough," upheld the Virginia law providing for the sterilization of mental defectives.

symptoms somewhat resemble those occurring at the menopause.

EUNUCHOIDISM.

Eunuchoidism is a condition presented by individuals called eunuchoids. These are persons, mostly males, who have not been castrated, but nevertheless present symptoms which in a large measure resemble those of eunuchs. There is faulty development and function of the sexual glands, especially of the interstitial cells, resulting in tall, slender stature, though some are obese with the characteristic distribution of fat as in the eunuch. The limbs are disproportionately longer than normal. The secondary sexual characteristics revert to those of the opposite sex. There is an incapability of procreation. In cases complicated by marked pituitary involvement, the eunuchoid may be stunted in growth and characteristically fat, corresponding to the condition described under dystrophia adiposogenitalis.

There is a strong hereditary tendency in eunuchoidism. In the female the condition is quite rare.

REJUVENATION.

Rejuvenation operations and "monkey gland" transplantations have recently been a major topic in medical literature and in popular novels. Such books as "Black Oxen" have recently become extremely good sellers. Also, it might be said that so useful has our next of kin the monkey become in this field that monkey farms have been instituted by promoters so that the supply of monkey glands might correspond

to the demand. There is some truth and much fallacy in the rejuvenation claims.

On the grounds that old age is due to a lessening of the internal secretion of the sex glands—that the interstitial cells of the sex glands have become lazy in their function or altogether quit their job, resulting in lagging physical and mental vigor associated with senility, an epidemic of rejuvenation experiments has recently taken place throughout the civilized world, with the hope that many years of life and usefulness could be added to the aged.

The grafting of portions of the sex glands of a lower animal, usually the monkey, under the skin of a human being—not necessarily in the usual location, but anywhere, is the operation of monkey gland transplantation. Instead of monkey glands, human glands from convicts just executed have occasionally been employed. It is claimed that in a percentage of those in whom the gland "takes" there occurs such improvement in physical, sexual and mental vigor as to render the body considerably younger than the actual age—a veritable rejuvenation. Another method of rejuvenation consists in the mere tying off or severing of the duct or tube which ordinarily carries away the external secretion. This results in sterilization and is supposed to result in stimulation of the cells of the internal secretion (the interstitial cells) to increased function. It is a simple painless operation. According to Morris,[1] Voronoff,[2] Steinach,[3]

[1] R. T. Morris: Med. Record, 1906, *69*, 697.
[2] Voronoff: Greffes testiculaires, Paris.
[3] Steinach: Wien. klin. Wchnschr., 1918, *9*, 1217.

Benjamen,[1] and other competent and sincere students of the subject, many individuals have been benefited to a remarkable degree by rejuvenation operations. The successes, however, are a minority of those who underwent the procedure, and have not yet stood the test of time.[2] Science may be on the right track, and if we can give this subject the quiet sober thought it deserves, it is possible that in course of time the longevity of the human race will be increased by decades. With this event and the additional ethical development of mankind on this mortal orb, may appear the mental giant—the spiritual superman.

THE INTERNAL SECRETION OF THE PANCREAS.

Scattered here and there throughout the structure of the pancreas are small areas or islets of cells known as the *islands of Langerhans.* It is in these tiny microscopic spots in a gland otherwise presenting an *external* secretion that the *internal* secretion of the pancreas is manufactured, a substance known as *insulin.* Insulin enables the individual properly to utilize starches and sugar, and if through structural or functional inadequacy the islands of Langerhans do not secrete enough insulin, diabetes, otherwise known as diabetes mellitus, occurs. This is a disease associated with excessive hunger and thirst, pro-

[1] H. Benjamen: Med. Jour. and Record, Dec. 17, 1924.

[2] Morris Fishbein is very skeptical about the efficacy of rejuvenation operations. To quote: "When all the evidence is assembled and considered *en masse* it becomes apparent that there is not as yet any actual proof that rejuvenation has been accomplished in a single individual . . ." Facts about Rejuvenation (Halderman-Julius Co.), 1926, p. 18.

gressive loss in weight, a marked increase in urinary secretion, and the presence in the urine and blood of large quantities of sugar. The far-reaching consequences of diabetes will not be mentioned here, except to say that the condition is most prevalent in Jews and Hindus, that it occurs in the most severe form in the young, and that it is at all times a disease requiring the most expert attention and cooperation in treatment. Insulin treatment in diabetes will be mentioned later.

THE DUCTLESS GLANDS AND GROWTH.

Growth of body and mind depends primarily upon the ductless glands, and to some extent upon heredity, geographical conditions, and the vitamins in the food.

The part played by the *thyroid* was discussed in the first chapter. The cretin, because of absence of a thyroid gland, is a perpetual infant—a small, pot-bellied idiot, late in teething and walking and scarcely ever capable of talking—useless to self and society. Partial retardation of growth is due to partial deficiency of the thyroid secretion, various grades of which are encountered. On the other hand, in instances of excessive thyroid secretion, there is occasionally observed some augmentation in height.

The *pituitary* gland and growth processes are also intimately related. An excess of anterior pituitary secretion is the cause of giant formation or gigantism if this occurs before the age of puberty. There are various gradations of increased secretion, so that a slight increase in height is observed here and there.

The tall, strong, muscular, well-developed man, is one whose anterior pituitary secretion is irreproachable. Oversecretion of the anterior pituitary in women is capable of adding some masculine characteristics to physical and mental habits in life. On the other hand, a deficiency of secretion of the anterior pituitary results in a degree of stunted growth or dwarfishness, with corresponding lessening of physical, sexual and mental development. The characteristics of *dystrophia adiposogenitalis* due to disease and deficiency of the anterior pituitary have been described. Anterior pituitary deficiency is usually associated with a corresponding posterior pituitary excess, and *vice versa.* An oversupply of posterior pituitary in a man results in a degree of effeminacy. This is usually accompanied by a somewhat persistent thymus and a deficiency of adrenal cortex.

In the consideration of growth and its relation to the ductless glands, we must make mention of obesity. To be stout is not necessarily to possess poorly acting ductless glands. In many instances, however, one or more endocrine glands are involved in varying degree. Deficiency of anterior pituitary secretion results in undue obesity which has characteristic distribution—the breasts, the lower abdomen, and the upper portion of the thighs. The same may be said of eunuchism and eunuchoidism in males. A somewhat similar process occurs as the result of the surgical removal of the ovaries. The menopause, associated as it is with a retardation of ovarian activities, is also accompanied by an increase in

weight. Thus it can be seen that, generally speaking, a deficiency of the internal secretions of the sex glands, being accompanied by a retardation of the secretion of the thyroid and the anterior pituitary, is very frequently responsible for obesity. The corpulency characterizing the approach of the fiftieth year of life is due to the partial arrest of thyroid and sexual secretions. The obesity of thyroid deficiency capable of occurring at any time (hypothyroidism, myxedema or cachexia strumipriva) described in the first chapter, is easily diagnosed by the presence of certain characteristic features pertaining to the skin, hair, facial expression, perpetual sleepiness, subnormal temperature, subnormal pulse rate, and subnormal basal metabolism.

THE DUCTLESS GLANDS AND MENTALITY.

That the internal secretions of the ductless glands are vitally concerned with the development and type of mentality requires no further evidence than a recall to memory of what was said concerning cretinism, myxedema, exophthalmic goiter, eunuchism, eunuchoidism, and dystrophia adiposogenitalis. In each we are dealing with abnormalities of the body associated with abnormalities of the mind. Normality, infantilism, imbecility, mental backwardness, genius, insanity, criminality—all are in a measure the result of ductless gland action or inaction as the case may be. In your own circle the ductless glands appear largely responsible for the various types of so-called "normal" individuals and their temperament and personality.

The even and easy-going person, the human dynamo, the sluggard, the leader, the mob member, the prince, the pauper, the laborer, the captain of industry, the mental genius, the philosopher, the egotist, the altruist, the phlegmatic, the emotional, the tender, and the cruel, and many more types, are largely the products of ductless gland mechanisms.

The *thyroid* is largely the moulder of mental proclivities. The sluggishness of cretinism is complete. The true cretin may rightfully be called the human "cabbage-head." Myxedema is a form of adult cretinism, the thyroid deficiency having occurred after the brain has developed. Here there is lack of stimulation of brain matter already present. Again, the person who is by a freakish trick of nature *slightly* hypothyroid is a stupid member of society. It takes him hours to see the point in a funny story, he is obtuse and uninteresting in conversation, there is no initiative, and far from worrying about it, he is not cognizant of his failings. In school life he was somewhat backward and perhaps looked upon as a moron. Most of these individuals become the hewers of wood and drawers of water.

Again, the sufferer from exophthalmic goiter, in whom there is an excessive thyroid secretion (associated with an excess of adrenalin secretion), is one who, far from being sluggish, is impatient with time itself. All physical and mental activities are sped up in the extreme. Thoughts occur without much urging or contemplation, are quickly disposed of, and are replaced by others equally fugacious. Emotionalism, too, dominates the individual. Crying and laughing

alternate without logical sequence and with little provocation. Inferences and conclusions are not preceded by the usual logical deductions, but are the result of intuitive mechanisms. Even at night the mind undergoes a veritable chaos of activities, planning, inventing, all at the expense of restful, invigorating sleep. Arising weary and fatigued, it requires a few hours for the individual to pull himself together again, when once more the series of mental and physical overexcitement is begun. Indeed, an individual suffering from typical exophthalmic goiter can easily be recognized by the specialist as far as the eye can reach by the telltale quickened physical behavior, whether it be in walking, nodding, turning about, or other miscellaneous body movements.

Contrary to what was said of those who suffer from slight or moderate thyroid deficiency, the person with a slightly excessive thyroid secretion who is not suffering with exophthalmic goiter nor is necessarily sick, is quick-minded and frequently quick-tempered. He sees a situation at a glance and makes the most of it. Keen, agile, ambitious, there is no waste of time, for is not time the most precious of all our possessions? It can be said of such a person that he lives the most, for he lives the greatest breadth and depth, hence the greatest totality of life. He puts the most into life and appears to get the most out of it. He can accomplish in a span of sixty years what it would require a hypothyroid, or even a normal individual, several times this length of existence to achieve. As a leader of men in activities or movements for the common good, such a person is revered

and respected by his fellows. Though in his abilities as leader in his chosen field he may gain the enmity and jealousy of his contemporaries, even these become, in the course of time, additions to the hosts of friends that he has gained. A goodly percentage of artists, musicians, philosophers, poets, and novelists issue from this type of humanity. It must not be imagined that the thyroid alone is capable of producing this variety of human beings; the anterior pituitary, the adrenals, and even a slightly persistent thymus may play their part. Despite apparent unlimited mental resources, such persons are easily fatigued. Hence unless due care is taken a so-called nervous breakdown or even exophthalmic goiter may develop.

That the *adrenals* participate in mental development has just been implied. In the above mentioned type of individual there is a reciprocal stimulation between the thyroid gland and the adrenal medulla. In the event of adrenal predominance, however, other types of human mentality arise. There seems to be a kind of antagonism between the secretion of the adrenal cortex and of the medulla. In those possessing an excess of medulla secretion (adrenalin), such emotions as fear, anger, and the like, predominate. Courage may not exist in sufficient quantity. A dominance of the secretions of the cortex, however, being associated with initiative and endurance, appears to add considerably to the courage of the individual in times of stress and strain. A plentiful supply of the secretion of the entire adrenals tends toward the making of one whose mental ability is

admirable. This, of course, is associated with the proper mechanism of the remaining ductless glands. An excess of adrenal cortex secretion in women has already been stated to be the cause of mental *virilism* or masculinity. Such women compete in practically all the activities commonly assigned to men.

The *pituitary* gland is not without its marked influence upon the mental mechanism of mankind. Deficient intellectuality is often ascribed to a deficiency of secretion of the anterior pituitary. An extreme example of this sort is observed in *dystrophia adiposogenitalis*. Such a condition is usually associated with an excess of posterior pituitary secretion, which, in turn, makes for feminine trends. A sufficiency of anterior pituitary, on the other hand, is characterized by good mental activity and often by genius.

It can thus be seen that the posterior pituitary secretion is opposed to the adrenal cortex in the sex mechanism, hence is partly responsible for the female mentality with its maternal instinct. Conversely, the anterior pituitary secretion, favoring adrenal cortex secretion, in turn favors masculinity.

That the *sex* glands are related to the mental development and trends of the individual has been mentioned. It has been said that the mind of woman with her passive nature, tender disposition, and maternal tendencies, is the product of her ovaries. The mind of man may also be the product of his sex glands, but to a lesser extent, for he is by nature destined to take the active or aggressive part in life's problems and activities. A deficiency of the sexual internal secretion, as occurs in eunuchoidism, or an

absence of it, as evidenced in eunuchism, is accompanied by a deficiency of anterior pituitary and adrenal cortex secretion, and characterized by deficiency of initiative and courage. The feminine characteristics of such individuals have already been mentioned. Hypersecretion of the sex glands gives rise to a kind of morbid, unreasonable, sexual concentration of the mind at the expense of other forms of thought consistent with mental normality.

We must also mention the various mental tendencies during the sexual epochs such as puberty, menstruation, pregnancy, the menopause and senility. The mind specialists find their work largely among individuals whose forms of insanity occurred during these critical periods of life. The first storm may begin during puberty, usually as a case of dementia precox. During pregnancy, too, various forms of insanity may develop. The menopause, associated with the emotional instability that is commonly observed, occasionally leads to a type of insanity that is difficult to overcome. And during senility (old age), there is still another type of insanity with which nerve specialists must cope.

THE DUCTLESS GLANDS AND STRENGTH.

From what has already been said it can be seen that the main ductless glands, *i.e.*, the thyroid, pituitary, adrenals and sex glands, are directly and indirectly related to the degree of strength and endurance possessed by the individual.

Deficient thyroid secretion as occurs in cretinism or in myxedema is associated with physical and

mental weakness. An increased thyroid secretion, as is seen in hyperthyroidism with or without exophthalmic goiter, is characterized by an *apparent* or *subjective* increase in strength and endurance, but this is at the expense of the principal in reserve energy, the tissues being burnt up during the overactivity characterizing the disease. Soon the reaction of marked fatigue sets in, and the patient confesses to weakness.

The adrenal glands are, however, the most important in this respect. Lack of adrenal secretion, being associated with a deficiency of adrenalin in the blood, results in marked weakness, lack of muscular tonus, and deficient endurance. A mild form of this sort is observed in nervous exhaustion, a condition otherwise known as neurasthenia, while the extreme is seen in Addison's disease, already described. A plentiful supply of adrenal secretion is associated with the desired weight, strength and endurance through muscular development and nervous energy.

The anterior pituitary, when secreting healthily, makes for strength and virility. When deficient the reverse is the case.

The same may be said of the sex glands. The weakness of the muscular system in eunuchs and in the aged is known. Successful rejuvenation operations may reinforce and improve the participation of these organs in the vigor processes of the body.

As in the consideration of other phases of the subject, it is thus seen that the question of weakness and strength is one of the involvement not of one

gland, but in varying degree of all the glands, including the involuntary nervous system.

THE DUCTLESS GLANDS AND AGE.

The thymus gland is regarded as the gland of youth, since it begins to shrink after the second year and has completely disappeared at about the age of puberty. During this period the gland is thought to be a deterrent of growth of the sexual and other structures upon the evolution of which development to adult life depends. The pineal gland, too, may be regarded as the gland of youth, for it seems to take up the deterring influence of the thymus after the second year. A persistence of the thymus gland beyond the time of its ordinary active stage results in an appearance of precocious youthfulness, or if you will, retardation of adult development. These individuals are somewhat rosy-cheeked, long-boned, effeminate in physical and mental habits, and do not appear to show readily the marks of age.

That the thyroid is an important factor in the determination of age is unquestionable. The similarity of expression between a cretin who has lived to ten years or more of age and an old man is startling. In both there is the senile expression, the poor mentality, the tendency toward sleepiness, the dry skin, sparse hair, and tendency toward arteriosclerosis. In both, too, we have a deficiency of thyroid secretion and of the internal secretion of the sex glands.

It can thus be seen that the thyroid secretion and that of the sex glands play a major rôle in the aging processes.

Sajous,[1] in commenting on the rôle of adrenal deficiency and senility remarks: "* * * it is clear that the lesions to which the adrenals are subjected during infections and autointoxication * * * greatly limit the functional area of the organs through the fibrosis they entail. It is quite probable, in fact, that centenarians owe their prolonged longevity mainly to the integrity of their adrenals." We might here add that undue frequency of strain upon the adrenal glands through emotions, strife and hurry characterizing modern life, by exhausting the adrenal function, is likewise a cause of premature senility.

It can thus be seen that senility or old age is largely associated with a multi-glandular deficiency in which the thyroid, sex glands and adrenals largely participate.

MIRACLES OF ENDOCRINOLOGY.

All that has been said in this outline of our ductless glands, though interesting, would be worthless if incapable of application in the relief of human suffering and the saving of life. Fortunately, endocrinologists have been able to wrest from Nature some of her mysteries which now serve as remarkable remedies. Let us now examine a few of these discoveries:

Thyroid substance of such animals as the sheep, hog, and cow, if employed early enough and under proper guidance, is capable of overcoming that dreadful condition resulting from absence of thyroid gland

[1] Charles E. de M. Sajous: The Internal Secretions and the Principles of Medicine, 10th Edition, 1922, F. A. Davis Co.

known as cretinism. Think of it! A pot-bellied, perfectly useless, vegetating idiot, incapable of physical or mental development, useless to self and the world, saved by the feeding of thyroid substance of the sheep or hog! If given within the first year of life, the child need not lose its future. The remedy may be required throughout life, but is it a calamity to be obliged to take a tablet or two of thyroid extract daily? By this means the child becomes a normal individual instead of a burden. The impetus to physical and mental growth by the use of thyroid feeding can only be appreciated by those who are fortunate enough to observe these cases with their own eyes. This is the earliest miracle of endocrinology.

Next to the above is the effect of the taking of thyroid extract upon myxedema or adult cretinism. A bulky, drowsy, stupid, almost worthless individual is reclaimed to accustomed health, usefulness, and happiness. Here, also, thyroid extract may require to be taken for a long time, but not necessarily so. There are many patients who need take it for but a few months or a year or two, following which the vestige of the patient's own thyroid gland begins to secrete satisfactorily.

There are other conditions in which thyroid substance of animals is of extreme service. For instance, some types of goiter respond splendidly to thyroid extract treatment. Some forms of asthma, constipation, epilepsy, and many forms of skin disease are relieved by this substance. In certain types of general debility as the result of widespread ductless gland

deficiency, thyroid extract serves to whip up the lagging glandular functions to a very satisfactory degree. In obesity incident to thyroid deficiency, the administration of thyroid extract is of splendid service.[1] Cases of delayed puberty, especially late menstruation, are markedly improved by judicious doses of thyroid extract. The same might be said of various forms of menstrual disturbances, and the physical and mental symptoms often occurring in troublesome degree during the menopause. It has been found by many that in various infectious diseases such as typhoid fever, rheumatism, blood poisoning, and especially in syphilis, the careful use of thyroid extract in combination with other appropriate remedies assists the reconstructive processes through an improvement in the resistance of the body against the attacking germs. In certain types of Bright's disease the taking of thyroid extract is of extreme benefit, clearing up albumen and casts in a manner superior to the effect of other remedies. The convulsions of pregnancy are prevented if thyroid extract is administered in proper dosage a few months in advance of the expected birth. Lastly, in many instances of stunted growth (without obvious thyroid deficiency), as well as premature old age, properly applied doses of thyroid extract are of remarkable service.

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[1] Here it must be emphasized that the indiscriminate use of this drug is extremely dangerous, and the yielding to the wiles of "obesity cures" from quack patent medicine concerns has resulted in many cases of total ruination of body and mind, and even in death. As in the case of all other maladies, obesity had better be treated by a good physician.

Adrenalin or epinephrin, the hormone or active principle of the adrenal gland medulla, is a substance of potentialities almost beyond belief. Every now and then one reads in the newspapers of a case of surgical shock in which the heart appears to have stopped beating. The timely injection of a few drops of adrenalin solution into the heart muscle, permitting the hypodermic needle to go right through the chest wall, has saved quite a few such lives, the heart becoming resuscitated, and the patient recovering. The usual forms of shock are frequently overcome by the injection of a few drops of adrenalin solution into the patient's veins. This is especially true of the shock incident to operations in which chloroform was used as an anesthetic.

In some forms of asthma, with the patient tugging away at his lungs for dear life, the injection beneath the skin of a few drops of adrenalin results, within a brief moment or two, in complete relief, with perfect ease of breathing! This effect lasts from one-half to several hours or even a day or two.

Combined with the administration of whole suprarenal gland of animals, the injection of adrenalin solution in cases of Addison's disease, a procedure known as the Muirhead treatment (after a Dr. Muirhead who was a sufferer from Addison's disease and in whom this treatment was first applied), may result in the prolongation of the patient's life by a year or two.

In milder forms of adrenal insufficiency with low blood-pressure and physical and mental depression, the taking of suprarenal gland in tablet form yields

splendid results and in many instances recovery. Though it is claimed by many skeptics that this substance is destroyed by the digestive juices, this is only partially true. If adrenal substance is taken early enough and in sufficient dosage, a satisfactory quantity of it appears to become absorbed and good results are obtained.

One of the most remarkable phenomena resulting from the action of adrenalin solution is seen when it is applied to a bleeding area on the surface of the body. Immediately there is a cessation of hemorrhage and a blanching of the skin as though all blood within it has disappeared! This property of adrenalin solution is often a lifesaving procedure in surgical operations of the nose and throat, and it is also frequently useful in the hemorrhage from a stomach ulcer.

Pituitary substance and more especially *infundibulin* or *pituitrin* (the active principle or hormone of the posterior pituitary gland) is almost as useful as the preceding. When in a woman about to give birth to an infant there is a futile dragging of weary, painful hours, and even days because of weakness of the muscular structure of the uterus, and the baby cannot be born, the injection into the skin of a few drops of a solution of pituitrin frequently yields the remarkable phenomenon of the birth of the baby within several minutes! Properly employed in selected cases this is indeed one of the miracles of medicine.

In certain instances of shock, pituitrin is even more powerful in its benefit than adrenalin, since

its effect is more sustained. It increases the strength of the heart muscle and the contraction of the blood-vessels, thus raising blood-pressure and overcoming the emergency.

In certain types of menstrual disturbances and also during the menopause, the use of pituitary substance by mouth and pituitrin by hypodermic injection has been found very useful. The same may be said of certain forms of bladder weakness.

There is a type of epilepsy which responds to pituitary treatment in a remarkable way. We must repeat that the physician must be given ample opportunity to diagnose and treat the case.

Extreme intestinal sluggishness, amounting to virtual paralysis of the intestines with many days' constipation as a consequence, responds remarkably to pituitrin injections, through the restoration of the intestinal walls to the necessary strength and contractile ability. This procedure has succeeded in accomplishing relief when all other measures have failed.

Cases of anterior pituitary disease described as *dystrophia adiposogenitalis* and *infantilism* are considerably benefited by the use of pituitary treatment. This is frequently combined with thyroid and sexual gland substance. There often results a change toward normal in the obesity, sexual characteristics, mentality, strength, and general sense of well-being. This treatment is most promising when instituted early in the disease.

As wonderful as any other phase of pituitary treatment is the effect of injections of pituitrin upon suf-

ferers from a disease known as *diabetes insipidus*. In this malady (contrary to the usual form of diabetes or diabetes mellitus), there is no excess of sugar in the urine and blood. There is, however, such a tremendous thirst and quantity of urine that gallons of it may be passed in 24 hours, rendering the sufferer miserable indeed. The constant distension of the bladder results in restlessness not only during the day, but throughout the night. An injection or two of a few drops of pituitrin beneath the skin accomplishes the remarkable feat of reducing the quantity of urine practically to normal, with restoration of comfort and strength. Though this is merely relief, still it is a wonderful step in the proper direction.

Pineal gland treatment has been used with considerable success in children of retarded development and in those with criminal tendencies. Reports are still meager and conflicting, but it is to be hoped that marked changes in aberrant youth will be effected by this means.

Sex gland treatment is still more or less in the experimental stage. Rejuvenation operations have already been discussed. These are intended to overcome physical, sexual, and mental debility incident to senility. It has just been remarked that sex gland preparations combined with pituitary and adrenal glands are of service in infantilism and dystrophia adiposogenitalis. If administered early, this combination is also of use in eunuchism and eunuchoidism.

Ovarian substance, injected either under the skin or in tablet or capsule form, is extremely serviceable in overcoming many of the symptoms incident to menstruation, pregnancy, especially the vomiting, and even the menopause, whether this was induced by natural processes or by the surgical removal of the ovaries. Ovarian substance is likewise of extreme usefulness in certain types of high blood-pressure in women.

Parathyroid gland is of remarkable service in conditions associated with a deficiency of calcium in the blood. Recently the active principle of the parathyroid glands, *parathyrin,* has been added by Collip,[1] of the University of Alberta, Canada, to the list of important, and even life-saving discoveries. An injection under the skin of parathyrin almost immediately increases the calcium content of the blood to a very high degree. Thus hemorrhage due to *hemophilia* (bleeder's disease) is at once overcome. But more remarkable than this, a condition known as *tetany,* mentioned under the description of parathyroid glands, is cured and the life of the patient saved by parathyrin injections. Among other conditions markedly improved by parathyroid substances, especially parathyrin, are certain types of epilepsy, rickets, shaking palsy (*paralysis agitans*), old wounds, and chronic ulcers resulting from varicose veins.

Insulin is perhaps the greatest discovery in endocrinology. Until 1922 diabetes was regarded as one

[1] J. D. Collip: Jour. Biol. Chem., 1925, 393.

of the most dreaded diseases. Then another triumph of medicine was announced. Banting and Best,[1] of the University of Toronto, announced the discovery of *insulin*. This substance is derived from the islands of Langerhans of animals. For a long time the world had waited for just such a boon, and now it had arrived! Injections of insulin promptly reduce the blood and urinary sugar to normal. The patient experiences a sense of relief from symptoms, and with due care in diet, is able to participate in the duties and pleasures of life as before. Indeed, patients brought into the hospital in a state of coma, dying, are now saved by insulin. Thousands of lives have already been saved, and many thousands of persons have been prevented from becoming serious diabetics through the interest in the disease that this discovery has stimulated. Insulin is efficient only if given by the hypodermic needle.

It must be remembered that insulin does not cure *advanced* diabetes. It is a substitute for the deficiency of the fatigued pancreas, resting this organ and permitting the patient properly to metabolize starches and sugar. Though under the influence of insulin, diabetic patients must still be on good behavior from a dietary point of view.

From what has been said on the ductless glands, we must, despite miracles already wrought through medical discoveries, beware of over-enthusiasm. It is only by a conservative attitude and hard work that scientific investigators succeed in furthering the

[1] F. G. Banting and C. H. Best: Jour. Lab. and Clin. Med., Feb. and May, 1922.

processes of life-saving. The layman must particularly guard against attractive advertisements of quack "gland treatments" so prevalent in the literature of newspapers and magazines. Scientific endocrinology has opened our eyes to great possibilities in the alleviation of human suffering and may some day answer the riddle of life itself.

INDEX

Abdomen in cretinism, 40
Aberrant goiter, 19, 51, 68
  of ovaries, 68
  of tongue, 68
  of trachea, 68
Absent thyroid, 39
Accessory thyroid (See Aberrant goiter)
Acquired goiter, 62
Acromegaly, 263, 266
  in exophthalmic goiter, 148
Active principle of thyroid, 20, 21
Acute exophthalmic goiter, 150
Adams and Crossly, 70
"Adam's apple" and goiter, 56
Adams, Samuel Hopkins, 131
Addison's disease, 269–270, 295
Addison, Thomas, 270
Adenoma of thyroid, 58, 62–64, 135
  toxic, 34, 38, 47, 48, 57, 62, 115, 135, 136
Adolescence and exophthalmic goiter, 179
  and goiter, 38, 60, 92, 112, 139
  and thyroid, 31, 33
Adolescent hyperthyroidism, 38
  hypothyroidism, 38
Adrenalin, 268
  treatment, 295–296
Adrenals, 267 (See also Suprarenals)
  in exophthalmic goiter, 148, 150, 161
Age and ductless glands, 33, 291–292
  and endemic goiter, 92, 93
  and exophthalmic goiter, 151, 167
  and pineal, 291
  and sex glands, 291
  and suprarenals, 291–292
  and thymus, 291
Age and thyroid, 32, 47, 291
  and tumor goiters, 59
Air and goiter, 118
Aircraft and exophthalmic goiter, 6, 248–249
Alaska, goiter in, 80
Albuminuria in myxedema, 45
Alcohol and thyroid, 35, 216
Alps, goiter in, 31, 79
Amusements and exophthalmic goiter, 169, 170
  and thyroid, 247
Anabolism, 22
Anatomy of thyroid, 18, 19
Andes Plateau, goiter in, 79
Anemia and goiter, 56, 75
  in exophthalmic goiter, 160
Anger and thinking, 241
Animals, goiter in, 69, 81, 97, 117
Appendix in treatment, 199
Appetite and thyroid, 23, 26
  in exophthalmic goiter, 158, 159
Appetizers in diet, 216
Asia, goiter in, 39
Asthma and adrenalin (See Adrenalin)
  and thymus, 272
  in myxedema, 45
Atrophy of thyroid, 18, 32, 44
Atterbury, W. W., 237
Autointoxication and goiter, 75
Automobiles and exophthalmic goiter, 6, 151

Babies, exophthalmic goiter in, 167
  goiter in, 81
Backwardness in children, 7 (See also Mental deficiency, cretinism)
Baillarger, 79
Banting, F. G. and Best, C. H., 300

Barton, B. S., 80, 88
Basal metabolism, 23, 24, 25
in exophthalmic goiter, 158, 163
Basedow's disease (See Exophthalmic goiter)
Bassoe, B., 266
Bathing in treatment, 195
Baumann, 21
Bavaria, goiter in, 80
Bed-wetting, 41
Behavior in exophthalmic goiter, 154
Benjamin, H., 281
Benson and Carter, 82
Berman, Louis, 253
Bernard, Claude, 255
Berne, goiter in, 80, 117
Berry, J., 117
Beverages and goiter, 118
Bircher, E., 124
Bladder in cretinism, 40
in exophthalmic goiter, 162
Bleeder's disease, 258, 299
(See Hemophilia)
Bleeding and exophthalmic goiter, 148
and hyperthyroidism, 27
Blood and thyroid, 27, 34
clotting and parathyroids, 258
pressure and suprarenal disease, 270
and thyroid, 27
in exophthalmic goiter, 65, 148
in myxedema, 45
in toxic adenoma, 65
supply of thyroid, 20
vessels and thyroid, 17
in exophthalmic goiter, 162
"Blue baby," 272
Body in exophthalmic goiter, 149
in myxedema, 44
resistance in exophthalmic goiter, 178
Bok, Edward, 246
Bones and cretinism, 40
and parathyroids, 258
Bootlegging and exophthalmic goiter, 170
Borderline goiter, 51
Bowels and hyperthyroidism, 48
and myxedema, 45
and thyroid, 26, 34, 35
in exophthalmic goiter, 160
Bram, I., 29, 107, 123, 124, 165
Bread in diet, 232–233
Breath, shortness of, in exophthalmic goiter, 149
Brissaud, E., 266
British Columbia, goiter in, 81
Brook trout, goiter prevention in, 97
Brown-Séquard, C. E., 255
"Burned out" thyroid, 44
Burnt sponge in goiter prevention, 118
Butter in goiter prevention, 111

Cachexia strumipriva, 38, 44, 47
(See also Myxedema and hypothyroidism)
Caesar and goiter, 79
Calcium and parathyroids, 258
Canada, goiter in, 79, 81
Cancer of thyroid, 38, 39, 59, 83, 115
Cantero, A., 117
Canus and Roussy, 261
Career in prevention of exophthalmic goiter, 179
Castration, 276
Catabolism, 22 (See also Metabolism)
Catalyst, thyroid as, 22
Caucasians, exophthalmic goiter in, 168
Cause of cretinism, 44
of endemic goiter, 84–88, 116–129
of exophthalmic goiter, 165–174
age in, 167
amusements in, 169, 170
bootlegging in, 170
childbirth in, 168
civilization in, 168
coffee in, 169
divorce in, 170
ductless glands in, 170
excitement in, 167–174
fright in, 167–174
heredity in, 166

Cause of exophthalmic goiter, individual types in, 171, 177
infections in, 170
influenza in, 170
insomnia in, 170
intense living in, 169
iodine drugging in, 171
jazz in, 170
liquor in, 169
mental stability in, 169
movies in, 169
night clubs in, 170
obesity "cures" in, 171
pneumonia in, 170
psychic trauma in, 167–174
race in, 168
sex in, 167
shock in, 167–174
sinuses in, 170
sleep in, 169, 170
smoking in, 197, 198
speed in, 170
summary of, 174
susceptibility in, 171
syphilis in, 170
teeth in, 170
temperature in, 168
thyroid extract in, 171
tobacco in, 197, 198
tonsils in, 170
tuberculosis in, 170
war in, 168
work in, 169
worry in, 169, 172, 174
Cause of goiter, 69, 119, 139
germs in, 117 (See also Infection)
iodine lack in, 118
McCarrison on, 120–123
water in, 117
of hypothyroidism, 44
of myxedema, 44
of thyroid deficiency, 44
Chatin, A., 118
Chest in exophthalmic goiter, 161
Chicago, goiter in, 62
Childbirth and exophthalmic goiter, 168
Childhood and thyroid, 31
Children and goiter, 6, 38, 80, 82, 92, 93, 101–102, 113
backwardness in, 7 (See also Mental deficiency and cretinism)
exophthalmic goiter in, 167
hypothyroidism in, 41
prevention of goiter in, 113
China, goiter in, 79, 116, 118
Choking by goiter, 56
Christy, Howard Chandler, 238
Circulation and thyroid, 17, 27
Civilization and exophthalmic goiter, 6, 7, 168
Clark and Pierce, 89
Classification of goiter, 57
Climacteric, 274 (See also Menopause)
Codliver oil in goiter prevention, 111
Coffee and exophthalmic goiter, 169
and goiter, 141
and thyroid, 35
habit, 245
in diet, 216
Cohen, F., 107
Coindet, 118
Collier's Weekly, 131
Collip, J. D., 299
Colloid goiter, 60
in thyroid, 20
Conception and exophthalmic goiter, 168
Conclusiveness of recovery from exophthalmic goiter, 207, 208
Condensed milk and goiter, 81
and thyroid, 35
Congenital goiter, 62
Connecticut, goiter in, 95
Conservation of thyroid, 46
Constipation and hyperthyroidism, 48
Contagion of goiter, 71
Controversy in treatment, 185
Cooperation in treatment, 190
Cough in exophthalmic goiter, 161

Course of exophthalmic goiter, 184, 202–206
of goiter, 59, 62–64, 74, 76, 83
of surgical goiter, 59, 62–64
of toxic adenoma, 62–64
Cows, goiter in, 81
Cream in diet, 219
Cretinism, 23, 38–41, 79, 81
abdomen in, 40
and development, 39, 40
and goiter, 39, 83, 85, 95
and pulse, 40
and thyroid, 37, 38
bladder in, 40
bones in, 40
ears in, 40
eyes in, 40
face in, 40
hair in, 40
heredity in, 39
hernia in, 40
incontinence in, 40
intestines in, 40
mentality in, 40
prevention of, 39, 41, 111
skin in, 40
sleep in, 40
speech in, 40
stature in, 40
symptoms of, 39, 40
teething in, 40
temperature in, 40
thyroxin in, 41
tongue in, 40
treatment of, 39, 41, 111
walking in, 40
Crile, G. W., 28
Crime and endocrines, 7, 43
and thymus, 271
and thyroid, 41
Criminal trends in children, 7, 43
Crisis in exophthalmic goiter, 129
Crotti, A., 116, 117
Crying in exophthalmic goiter, 152
Cunningham, R., 107
Cure of goiter, 35, 77, 113, 123
versus prevention, 113
Cushing, H., 267
Cystic goiter, 58, 115, 135
Cystic goiter, prevention of (See Prevention surgical goiter)
treatment of, 115

Dangers of iodine, 99, 116–129
Darrow, Clarence S., 238
Davis, C. H., 108
Deaf-mutism, 39, 81, 83, 85, 95
Deficiency of thyroid, 43
(See also Cretinism, hypothyroidism, myxedema)
Definition of exophthalmic goiter, 147
of goiter, 51
Degeneration of thyroid, 34
Depression *versus* stimulation of thyroid, 34
de Quervain, 80
Dermographia in exophthalmic goiter, 148, 160
Descartes, 272
Description of exophthalmic goiter, 147
Development and cretinism, 39, 40
and thyroid, 29, 31
of exophthalmic goiter, 151–153
of goiter, 75
of substernal goiter, 66
Diabetes and exophthalmic goiter, 148, 150
and pancreas, 281
and thyroid, 26
insipidus, 298
mellitus, treatment of, 299–300
Diagnosis of exophthalmic goiter, 151, 160, 161
of goiter, 51–56, 137–139
Diarrhea in exophthalmic goiter, 150, 160
in hyperthyroidism, 48
Diet and exophthalmic goiter, 231–234
and goiter, 87, 90, 112
and hyperthyroidism, 48
and thyroid, 35, 213–234
and weight, 233–234
appetizers in, 216
bread in, 232, 233
coffee in, 216

Diet, cream in, 219
eggs in, 218
extra nourishments in, 230
fattening, 226
habits and goiter, 74
how to eat, 221
ideal, 215
in exophthalmic goiter, 231–234
in non-surgical goiter, 140, 231
in treatment, 196, 205, 217–219
milk in, 218
quantitative aspect, 222
reduction, 222–225
spices in, 216
vegetarian, 215
when to eat, 220
Digestion and exophthalmic goiter, 150, 159, 160
and thyroid, 35
Disappearance of intrathoracic goiter, 67
Discrimination in treatment of goiter, 134
Disease, thyroid in, 35, 37
Disorientation in exophthalmic goiter, 153
Distribution of goiter, 6, 79, 88
Divorce and exophthalmic goiter, 7, 170
Dix, Dorothy, 238
Dock, G., 89
Drafted men, goiter in, 83
Drinks, soft, 216
Drugs and goiter, 55
in treatment, 189
Ductless glands and age, 38, 291–292
and crime, 7, 43
and education, 7
and eugenics, 42
and exophthalmic goiter, 148, 149, 170
and goiter, 42
and growth, 42, 282–284
and heredity, 42
and life, 301
and mind, 284–289
and personality, 253
and society, 7
and strength, 289–291
Ductless glands and thyroid, 17, 25
and the criminologist, 7, 43
and the school teacher, 7
and the sociologist, 7, 42
description of, 253
enumerated, 257
functions of, 256
hormone of, 256
what are they? 253
Durant, Will, 238
Dysthyroidism (See Exophthalmic goiter)
Dystrophia adiposogenitalis, 265, 297

Early exophthalmic goiter, 150, 151
Ears in cretinism, 40
Eat calmly and smile, 222
Eating and thyroid, 213–234
Edison, Thomas A., 237
Education and endocrines, 7
and exophthalmic goiter, 179
Effects of endemic goiter, 95, 96
Efficiency and sleep, 235
Effort syndrome, 169
Eggs in diet, 218
Else, J. E., 108
Emaciation and exophthalmic goiter, 157, 158
and goiter, 56, 226
Emergencies and thyroid, 32
Emotional reaction, threshold of, 180, 242
Emotions and eating, 222
and exophthalmic goiter, 151, 152, 180
and thyroid, 35, 241–245
Endemic goiter, 61, 79
a deficiency disease, 86
and adolescence, 92
and age, 92, 93
and children, 92, 93, 101–102
and cretinism, 83, 85, 95
and deaf-mutism, 39, 81, 83, 85, 95
and growth, 95
and hypothyroidism, 83
and idiocy, 39, 42, 85, 89, 95
and infections, 96
and iodine, 87, 103

Endemic goiter and light, 86
and mentality, 95
and myxedema, 83
and race, 86
and school attendance, 96
and sex, 82, 93, 94
and soil, 82, 86
and temperature, 86
and tonsils, 96
and water, 83
and weather, 86
cancer of, 83
cause of, 84, 86, 88, 116–129
course of, 83
effects of, 95, 96
general prevention, 102–104
in Connecticut, 95
individual prevention, 101
in negroes, 95
in Ohio, 101
in United States, 83, 85–109
kelp in, 102
malignancy in, 83
prevention, 86, 97, 110
recovery from, 93
toxicity in, 83
versus sporadic goiter, 61, 62, 83
Endemicity of exophthalmic goiter, 82
Endocrines (See Ductless glands)
Endocrinologist in treatment, 189
Endocrinology, 253–301
miracles of, 292–301
Englebach, W., 43
Englebach, W. and Tierney, J. L., 261
Entertainment and exophthalmic goiter, 7
Epidemics of goiter, 70
Epilepsy and thyroid, 42
Epinephrin (See Adrenalin)
Erskine, John, 238
Eskimos and diet, 214
Eugenics and thyroid, 42
Eunuchism, 276–279
Eunuchoidism, 279
Europe, goiter in, 6, 39
Ewald, 33
Excessive thyroid function, 47
(See also Hyperthyroidism, toxic goiter, toxic adenoma, exophthalmic goiter)
Excitement and exophthalmic goiter, 167–174
versus reasoning, 241
Exercise in treatment, 194, 195, 206
Exertion and thyroid, 18
Exophthalmic goiter a constitutional disease, 165, 166, 185
and acromegaly, 148
and age, 151, 167
and aircraft, 6, 248–249
and automobiles, 6, 151
and bleeding, 148
and civilization, 6, 7
and emaciation, 157
and entertainment, 6–7
and habits, 7
and heart, 149, 150
and hemorrhage, 148
and heredity, 65
and highwaymen, 151
and iodine, 128–130
and jazz, 6, 249
and kidneys, 149
and liver, 149
and living standards, 7
and marriage, 7
and menstruation, 148
and mind, 65, 149
and miscarriages, 148
and movies, 7
and obesity, 157, 158
and ovaries, 148
and pancreas, 148
and parathyroids, 148
and pineal, 149
and pituitary, 148
and pregnancy, 162, 167
and reduction "treatment," 179, 181
and seashore, 82
and shell shock, 169
and skin, 148
and sleep, 161, 162, 169, 170, 194, 236

Exophthalmic goiter and society, 7
and sociology, 7
and speed, 6
and sterility, 148
and suprarenals, 148
and the theatre, 7
and thinking, 6
and thrills, 249
and thymus, 148
and thyroid, 28, 30, 147, 148, 150, 151, 155, 156, 165
and tremor, 148
and war, 7, 168
and weight, 157, 196, 197, 233, 234
and worry, 152
blood-pressure in, 65, 148
cause of, 165–174
conception in, 168
course of, 184
crises in, 129
definition of, 147
description of, 147
diabetes in, 148
diagnosis of, 151, 160, 161
diet in, 231–234
digestion in, 150, 159, 160
ductless glands in, 148, 149
eyes in, 39, 64, 151, 152, 156, 157, 165, 184
glycosuria in, 148
goiter in, 39, 64, 147, 148, 150, 155, 156, 165, 183, 184, 206, 207
hyperthyroidism in, 47, 48
in aged, 167
in babies, 167
in Caucasians, 168
in children, 167
in females, 167
in Hebrews, 168
in Irish, 168
in Latins, 168
in males, 167
in Mongolians, 168
in negroes, 168
is not epidemic, 82
is not goiter, 165, 166, 185
Exophthalmic goiter is not hyperthyroidism, 147, 185
myxedema following, 44
operation in, 65, 136, 137, 164
prevention of, 175–182
recovery from, 207, 208
susceptibility to, 175, 177, 178
symptoms of, 147–164 (See Symptoms of exophthalmic goiter)
synonyms of, 147
tonsillectomy in treatment of, 171
treatment of (See Treatment of exophthalmic goiter)
types of, 150
versus toxic adenoma, 64–65
Exophthalmos in exophthalmic goiter, 39, 64, 156, 157
Eyebrows in myxedema, 46 (See Symptoms of myxedema)
Eyes in cretinism, 40
in exophthalmic goiter, 39, 64, 151, 152, 156, 157, 165, 184
in toxic adenoma, 64

Face in cretinism, 40
in exophthalmic goiter, 154
in myxedema, 45
Fads in medicine, 133
False goiter, 52, 54
Falta, W., 276
Fatigue and myxedema, 45
and suprarenal disease, 270
and thyroid, 35
in exophthalmic goiter, 158, 159
Fat neck, 56
Fattening diet, 226
Fear and health, 243–245
and suprarenals, 268
and thinking, 241
of goiter, 55
Feeble-mindedness, 42, 43 (See also Idiocy, mental deficiency)
Fever and thyroid, 25
in exophthalmic goiter, 150
Fibrous goiter, 58, 135
Finns, goiter among, 91
Fish, goiter in, 97

Fish, in treatment, 106
Fishbein, M., 281
Flajani's disease (See Exophthalmic goiter)
Flesh foods and exophthalmic goiter, 213–215
and goiter, 94
Foard, F. T., 108
Focal infections (See Infections)
Foods and goiter, 111, 113, 118
Forced feeding in treatment, 196, 205
Fosdick, Harry E., 237
Fowl, goiter in, 81
France, cretins in, 79
goiter in, 79
Friends in treatment, 200
Fright and exophthalmic goiter, 167–174
Froehlich's disease, 265
Functional variations of thyroid, 25, 26
Functions of thyroid, 20

Gall-bladder in treatment, 199
Games in treatment, 202
Gauls and goiter, 79
Geographical influences, 61, 62 (See also Endemic goiter)
Germany, goiter in, 79
Germs and goiter, 84, 117 (See also Infections)
Gigantism, 262, 266
Glacial periods and goiter, 82
Gland equilibrium and thyroid, 25
Glands of internal secretion (See Ductless glands)
Gley, 33
Globus hystericus and goiter, 56
Glycosuria in exophthalmic goiter, 148 (See also Pancreas)
Goetsch, E., 261
Goiter, aberrant, 51, 68
of ovaries, 68
of tongue, 68
of trachea, 68
about Great Lakes, 54, 79, 83, 90
about St. Lawrence River, 79
accessory, 51, 68
acquired, 62
Goiter, adenomatous, 58, 62–64, 135 (See also Adenoma, toxic)
adolescent, 38, 60, 112, 139
among American Indians, 88, 89
among Finns, 91
among Scandinavians, 91
a national problem, 81
and air, 118
and anemia, 56, 75
and autointoxication, 75
and beverages, 118
and Chinese, 116, 118
and coffee, 141
and condensed milk, 81
and condiments, 74
and cretinism, 39
and deaf-mutism, 39, 83, 95
and diet, 74, 87, 90, 112
and drugging, 55
and emaciation, 56, 226
and flesh foods, 74
and foods, 74, 118
and germs, 84, 117 (See Infections)
and glacial periods, 82
and growth, 95
and heredity, 72, 112
and hygiene, 74, 113
and hyperthyroidism, 48
and hysteria, 56
and idiocy, 39, 42, 43, 95 (See also Mental backwardness and mental deficiency)
and improper feeding, 74
and infection, 70, 71, 75, 87, 96
and influenza, 75
and intestines, 75
and intoxications, 87
and iodine, McCarrison's views, 120–123 (See also Iodine)
and Japanese, 74
and kidneys, 77
and liver, 77
and lymphatics, 56
and meat-eating, 141
and menopause, 74, 87
and menstruation, 113
and mental deficiency, 39, 42, 43
and mentality, 39, 42, 43, 95
and nervousness, 64

Goiter and nursing, 77
and obesity, 56
and occupation, 90
and overwork, 112
and pelvic disease, 74
and pregnancy, 74, 77, 87, 112, 139
and puberty, 60, 73, 76, 87, 112, 139
and quacks, 55, 131–133
and race, 74, 90, 95
and sea-coast, 90
and sea weed, 74
and sex, 73, 93, 94
and soils, 82, 84, 118
and spices, 74, 141
and tea, 141
and teeth, 70, 112
and tonsils, 70–71, 96, 112
and trembling, 57, 64
and tumors of pelvis, 74
and undernutrition, 56, 74, 139, 140
and U. S. Public Health Service, 85–107
and war, 89, 116
and water, 84, 88
a nutritional problem, 105
belts, 79, 120
borderline, 51
cancerous, 38, 39, 59, 115
causes of, 69, 119, 139
choking by, 56
classification of, 57
colloid, 50
congenital, 62
contagion in, 71
course of, 74, 76
cure of, 77, 113, 123
cystic, 56, 58, 115, 135
definition of, 51
development of, 75
diagnosis of, 51–56, 137–139
distribution of, 6, 79, 88
endemic, 61, 79
and deaf-mutism, 39, 83, 95
and hypothyroidism, 83
and soils, 82
cause of, 84, 86, 88, 116–129
in United States, 83, 85–109
Goiter, endemic, prevention of, 86
structure of, 83
toxicity in, 83
epidemics, 70
false, 52, 54
fibrous, 58, 135
fountain, 116
geographical influences in, 61, 82
globus hystericus and, 56
hygienic treatment of, 141
hyperplastic, 60, 147
(See also Exophthalmic goiter)
hypertrophic, 60
imaginary, 52, 54
in Alaska, 80
in Alps, 31, 79
in American Indians, 80
in Andes Plateau, 79
in animals, 69, 81, 97, 117
in Asia, 39
in babies, 38, 81
in Bavaria, 80
in Berne, 80, 117
in British Columbia, 81
in Canada, 79, 81
in Chicago, 62
in children, 6, 38, 80, 82
in China, 79
in cows, 81
indefinite, 5
in drafted men, 83 (See also 85–109)
in Europe, 6, 39
in exophthalmic goiter, 39, 64, 147, 148, 150, 155, 156, 165, 183, 184, 206, 207
infections in, 112
in fish, 97
in fowl, 81
in France, 79
in Germany, 79
in Great Lakes region, 6
in Greece, 116, 118
inherited (See Heredity)
in Himalayans, 79, 80
in Hindus, 74
in Holland, 117
in Idaho, 90
in India, 79
in infancy, 38, 81

Goiter in Italy, 79
in Michigan, 89, 90
in Minnesota, 90
in Montana, 90
in Munich, 80
in negroes, 95
in New Jersey, 90
in New York, 6
in New Zealand, 82
in North America, 80
in North Dakota, 90
in Northwestern States, 80, 83, 90
in Ohio, 90
in Oregon, 89
in Pembertson Meadows, 81
in Pennsylvania, 90
in Philadelphia, 62
in rats, 117
in Rochester, N. Y., 110
in Rome, 116
in Sault Ste. Marie, 110
in South America, 79
in Southern States, 90
in Switzerland, 6, 79, 80, 81, 119
in United States, 83, 85–109
in Utah, 90
in Utrecht, 117
in Virginia, 89
in Washington State, 90
in West, 79
in West Virginia, 89
in Wisconsin, 90
in Wyoming, 90
intrathoracic, 51, 53, 57, 65
and quacks, 67
diagnosis of, 67
iodine in, 116–129
in prevention of, 112
is it increasing? 106
malignant (See Cancer)
medicinal treatment of, 142
neglect of, 77
non-surgical, 58, 60, 136
non-toxic, 57
non-tumorous, 58, 60, 136
of ovaries, 68
of tongue, 68
of trachea, 68
operative, 135–136
Goiter, palpitation in, 63
pathology of, 58
phobia, 55
premenstrual, 63
pressure by, 136
prevention (See Prevention of goiter)
primary toxic (See Exophthalmic goiter)
puberty, 60, 73, 76, 87, 112, 139
racial immunity in, 74
recovery from, 93
salmon eating in, 81
sporadic, 61, 69
cause of, 119
prevention of, 112
substernal, 51, 57, 66
sudden onset of, 75
surgery of, 55
surgical, 58
(See also Tumorous goiter)
cause of, 139
prevention of, 114
surveys, 85–107
susceptibility to, 175
tonsillectomy in, 71
toxic, 34, 38, 47, 57, 135
(See Hyperthyroidism, toxic adenoma)
metabolism in, 58, 64
treatment, 131–143
tumorous, 58
prevention of (See Prevention of surgical goiter)
types of, 57
without symptoms, 38
(See also Endemic goiter, sporadic goiter and simple goiter)
zones in United States, 83
Goler and Willis, 108
Gonads (See Sex glands)
and thyroid, 31
Graves's disease (See Exophthalmic goiter)
Great Lakes, goiter about, 6, 54, 79, 83, 90
Greece, goiter in, 116, 118
Growth and ductless glands, 282–284

Growth and endemic goiter, 95
and endocrines, 42
and goiter, 95
and pituitary, 282–283
and thyroid, 18, 23, 29, 31–43, 282
Guanidin and parathyroids, 258

Hair in cretinism, 40
in exophthalmic goiter, 161
in myxedema, 45
Hall, W. W., 108
Hartsock, C. L., 108, 126
Harvin, Clough and Clark, 108
Hathaway, J. C., 79
Hayhurst, E., 108
Health and thyroid, 30
Heart and hyperthyroidism, 48
in exophthalmic goiter, 149, 150, 152, 155, 162
in intrathoracic goiter, 66
in toxic goiter, 57
mechanical goiter, 66
rate and thyroid, 27 (See Symptoms, heart)
Heat and hyperthyroidism, 48
and thyroid, 25, 50
Hebrews, exophthalmic goiter in, 168
Hemophilia and parathyroids, 258
treatment of, 299
Hemorrhage and exophthalmic goiter, 148
and hyperthyroidism, 27
and parathyroids, 258
Hercus and Baker, 108
Heredity and cretinism, 39
and endocrine disorder, 42
and exophthalmic goiter, 65, 166
and goiter, 72, 112
and toxic adenoma, 65
Hermaphroditism, 275
Hernia in cretinism, 40
in myxedema, 40
Hertzler, A. E., 187
Hibernation in treatment, 193
Himalayans, goiter in, 79, 80
Hindus and goiter, 74
Hoarseness in exophthalmic goiter, 161
Holland, goiter in, 117
Home treatment, 191
Hoover, C. F., 188
Hormone of thyroid, 20, 21
Horsley, V., 33
Hospital treatment, 191
Houston, A., 108
Hunt, R., 21
Hunziker, H., 119
Hurst, Fannie, 238
Hutchinson, W., 108
Hygiene and exophthalmic goiter, 139, 141
and goiter, 74, 113
and hyperthyroidism, 48
and prevention, 33, 113
and thyroid, 33
Hygienic treatment of exophthalmic goiter, 139, 141
Hyman, H. T., 187
Hyperplastic goiter, 60, 147
(See also Exophthalmic goiter)
Hyperthyroidism, 34, 38, 47, 48, 57, 62, 135, 136
(See also Toxic goiter, toxic adenoma)
adolescent, 38
and bleeding, 27
and constipation, 48
and goiter, 48
and heredity, 65
and infections, 48
and iodine, 68, 123–129
and irritability, 48
and meat eating, 48
and metabolism, 49, 58, 64
and mind, 48
and nervousness, 48
and operations, 27
and overwork, 48
and pulse, 48
and sleep, 48, 236
and speed, 48
and subnutrition, 48
and teeth, 48
and thyroid, 30
and tobacco, 48
and tonsils, 27, 48
and weight, 48
and worry, 48

Hyperthyroidism, diarrhea in, 48
diet in, 48
heart in, 48, 57
heat in, 48
hygiene in, 48
in exophthalmic goiter, 47, 48
is not exophthalmic goiter, 147, 185
kidneys in, 48
neck in, 58
operation in, 65
palpitation in, 57
skin in, 43, 48
sleep in, 48
strength in, 48
sweating in, 57
symptoms of, 48
treatment of, 135, 136
weakness of, 58
with hypothyroidism, 49
Hypertrophic goiter, 60
Hypophysis (See Pituitary)
Hypothyroidism, 22, 23, 34, 38, 43, 44, 47
(See also Cretinism, myxedema, thyroid deficiency)
adolescent, 38
and endemic goiter, 83
and obesity, 41
and thyroid, 30
in children, 41
infantile, 39
mild, 45
skin in, 43
treatment of, 39, 41
with hyperthyroidism, 49
Hysteria and goiter, 56

Ice bags in treatment, 196
Idaho, goiter in, 90
Idiocy, 39, 42, 85, 89 (See also Mental deficiency)
Imaginary goiter, 52, 54
Immunity and thyroid, 34
Improper feeding and goiter, 74
Incontinence in cretinism, 40
Indefinite goiter, 51
India, goiter in, 79
Indians, American, goiter in, 80, 88, 89
Individualization in treatment, 189
Infancy and thyroid, 31, 38, 98, 111, 112
Infected water in causation, 117
Infection and endemic goiter, 96
and exophthalmic goiter, 170
and goiter, 70, 71, 75, 87, 96, 112, 139
and hyperthyroidism, 48
and myxedema, 44, 45
and thyroid, 18, 28, 33, 34, 35, 44, 52, 140, 181
Inflammation of thyroid, 76
Influenza and exophthalmic goiter, 170
and goiter, 75
and thyroid, 35
Inherited goiter (See Heredity)
Insanity and thyroid, 7
Insomnia and exophthalmic goiter, 161, 162, 170, 236
Insomnia and toxic goiter, 57
Insulin, 254, 281, 299
Intensive life and exophthalmic goiter, 169
Internal secretions (See Ductless glands)
Intestines and goiter, 75
and thyroid, 26, 33
in cretinism, 40
in exophthalmic goiter, 160
Intoxications and goiter, 87
Intrathoracic goiter, 51, 53, 65
diagnosis of, 67
disappearance of, 67
heart in, 66
pressure symptoms in, 66
"recovery" from, 67
toxicity in, 67
treatment of, 136
X-rays of, 53, 67
Involuntary nervous system in exophthalmic goiter, 149
"Inward" goiter, 51
(See also Intrathoracic goiter)
Iodine abuse, 113
and endemic goiter, 87
and exophthalmic goiter, 128–130
a poison, 100

Iodine content of thyroid, 21
variations, 22
dangers of, 68, 116, 129, 171
hyperthyroidism, 61, 68, 123–129
in causation, 118
in goiter prevention, 97, 98, 103, 107, 110, 112
in pregnancy, 104, 105, 111
in thyroid gland, 119
in treatment of cretinism, 111
McCarrison's views on, 120–123
prevention, dangers of, 99
of goiter, 100, 116–129
toxicity, 61, 68, 123–129
treatment, 22, 55, 61, 103, 116–129
of exophthalmic goiter, 128–129
variations in thyroid, 22
versus goiter, 116–129
Iodized food in treatment, 103
salt in endemic goiter, 103
in prevention, 101, 126
Iodothyrin, 21
Irish, exophthalmic goiter in, 168
Irritability and hyperthyroidism, 48
Irritants and thyroid, 33
Irritation of thyroid, 34
Islands of Langerhans, 281
Italy, goiter in, 79
Itching in exophthalmic goiter, 161

Jackson, A. S., 124
Japanese and goiter, 74
and thyroid, 22
Jarvis, Clough and Clark, 111
Jazz and exophthalmic goiter, 6, 170, 249

Kelp in endemic goiter, 102
in prevention, 111
in treatment, 102
Kendall, E. C., 21
Kerr, W. T., 80
Kidneys and exophthalmic goiter, 149
and goiter, 77
and hyperthyroidism, 48
and myxedema, 45
and thyroid, 23, 26, 34
Kimball, O. P., 108, 124
Klinger, R. P., 119
Kreuter, A., 80

Lactation and thyroid, 51
Latins, exophthalmic goiter in, 168
Laughter and thyroid, 250
Life and endocrinology, 301
Light and endemic goiter, 86
Liquor and exophthalmic goiter, 169
and thyroid, 249
Liver and exophthalmic goiter, 149
and goiter, 77
and thyroid, 34
Live stock, goiter in, 81
Lloyd, B., 72
Location of thyroid, 18
Loeb, L., 213
Lombroso, 116
Lorand, A., 32, 33, 214
Love and Davenport, 108
Lungs in exophthalmic goiter, 161

Mackenzie, J., 188
Males, exophthalmic goiter in, 167
Malignancy in endemic goiter, 83
of thyroid, 38, 39, 59
Malignant goiter (See Cancerous thyroid)
Marine, D., 85, 89, 104, 107
Marine and Kimball, 101, 118
Marine and Lenhart, 97
Marine, Lenhart, Kimball and Rogoff, 108
Markoe, J. W., 167
Marriage and exophthalmic goiter, 7
Massage in treatment, 195
McCarrison, R., 8, 80, 88, 117, 120, 122
McCarrison's views on cause of goiter, 120–123
McCarrison's views on iodine, 120–123
McClendon and Hathaway, 108, 118
McClendon and Williams, 83
McClure, R. D., 124
McMahon, 43

Measurement of neck, 52
Meat eating and goiter, 141
and hyperthyroidism, 48
and myxedema, 214
and thyroid, 35, 213–215
Mechanical goiter heart, 66
Medical treatment of exophthalmic goiter, 186, 189
Medicines in exophthalmic goiter, 198
Melancholy in exophthalmic goiter, 153
Memory and myxedema, 44
Men, drafted, goiter in, 83
Menopause and goiter, 87
and myxedema, 44
and sex glands, 274
and simple goiter, 74
and thyroid, 32, 33, 52
Menstruation and exophthalmic goiter, 148, 162
and goiter, 113
and thyroid, 18, 26, 32, 35, 51, 113
Mental adjustment, 194, 199–202
deficiency and goiter, 23, 39, 44
and thyroid (See Cretinism, hypothyroidism, myxedema)
Mental development in cretinism, 40
Mentality and exophthalmic goiter, 150–154, 162, 169
and goiter, 39, 95
and myxedema, 44
and thyroid, 23 (See Mind)
Metabolic rate, 37
Metabolism, 22, 23, 25
and hyperthyroidism, 49
and hypothyroidism, 45
and myxedema, 45
and pregnancy, 43
and thyroid, 17, 22, 50
and toxic goiter, 58, 64
Michigan, goiter in, 89, 90
Mild hypothyroidism, 45
Mild myxedema, 45
Milk in diet, 218
in treatment, 106
Mind and ductless glands, 284–289
Mind and exophthalmic goiter, 65, 149, 150–154, 162, 194–202
and hyperthyroidism, 48
and hypothyroidism, 23, 40, 44
and pituitary, 288–289
and suprarenals, 287–289
and thyroid, 17, 28, 31, 285–287
and toxic adenoma, 65
Minnesota, goiter in, 90
Miracles of endocrinology, 292–301
Miscarriages in exophthalmic goiter, 168
Mongolians, exophthalmic goiter in, 168
"Monkey glands," 279–281
Montana, goiter in, 90
Moods in exophthalmic goiter, 152, 153
Morris, R. T., 280
Movies and exophthalmic goiter, 7, 169, 179
Munich, goiter in, 80
Muscles in myxedema, 44
Music and thyroid, 250
in treatment, 202
Myxedema, 23, 38, 43, 44, 47
(See also Cretinism, hypothyroidism, thyroid deficiency)
albuminuria in, 45
and endemic goiter, 83
and infections, 44, 45
and meat eating, 214
and metabolism, 45
and muscles, 44
and pulse, 45
and senility, 44
and weight, 45
asthma in, 45
blood-pressure in, 45
bowels in, 45
eyebrows in, 46
face in, 45
fatigue in, 45
following exophthalmic goiter, 44, 164
hair in, 45
hernia in, 40
in exophthalmic goiter, 44, 164
joints in, 44
kidneys in, 45

Myxedema, memory in, 44
menopause in, 44
mild, 45
operative, 44
pains in, 44
pregnancy in, 44
sense perception in, 45
sex incidence in, 44
skin in, 43, 45
sleep in, 45
speech in, 45
temperature in, 45
wounds in, 45

Nausea and thyroid, 26
in exophthalmic goiter, 150, 159, 161
Naylor, J. B., 108
Neck cysts and goiter, 56
fat, 56
in exophthalmic goiter, 152–156
in toxic goiter, 58
lymphatics and goiter, 56
measurement, 52
Neglect of goiter, 77
Negroes and goiter, 95
exophthalmic goiter in, 168
Nervousness and goiter, 64
and hyperthyroidism, 48
and toxic goiter, 57
Nervous system in exophthalmic goiter, 150, 151, 199
involuntary, in exophthalmic goiter, 149
Neuritis in exophthalmic goiter, 162
Neurocirculatory asthenia, 169
New Jersey, goiter in, 90
New York, goiter in, 6
New Zealand, goiter in, 82
Night clubs and exophthalmic goiter, 170
Non-operative goiter, 136
treatment of exophthalmic goiter, 186
Non-surgical goiter, 136
diagnosis of, 137–139
diet in, 140
neglect of, 140
treatment of, 139–143
Non-toxic goiter, 57
Non-tumorous goiter, 58, 60
(See also Non-operative goiter)
North America, goiter in, 80
North Dakota, goiter in, 90
Northwestern States, goiter in, 6, 80, 83, 90
Nose and thyroid, 35
Nursing and goiter, 51, 77
Nutrition and goiter, 56

Obesity and exophthalmic goiter, 157, 158
and goiter, 56
and hypothyroidism, 41
"cures," 35, 127–128, 171
Occupation and exophthalmic goiter, 180
and goiter, 90
Offspring and the thyroid, 35
Ohio, goiter in, 90, 101
Olesen, Robert, 8, 85, 108, 109, 126, 129
Olin, R. M., 109
Operation and hyperthyroidism, 27
and parathyroids, 259
in exophthalmic goiter, 65, 136, 137, 164
in toxic adenoma, 65, 135, 136
in treatment, 183–187, 199
on thyroid, 28, 52
when necessary, 59, 61
Operative goiter, 135–136
Operative mortality, 185
myxedema, 44
recovery, 185, 187
Opotherapy, 29
Oregon, goiter in, 89
Osler, William, 17
Ovaries and exophthalmic goiter, 148
and thyroid, 26
goiter of, 68
Overwork and goiter, 112
and hyperthyroidism, 48

Pain in myxedema, 44
Palpitation in exophthalmic goiter, 152

Palpitation in exophthalmic goiter (See also Heart)
in goiter, 83
in toxic goiter, 57
Pancreas and diabetes, 281
and exophthalmic goiter, 148
and thyroid, 26
internal secretion of, 281
Paracelsus, 79
Paralysis agitans, 299
Parasympatheticotonia, 149
Parathyrin, 259, 299
Parathyroids and blood clotting, 258
and bones, 258
and calcium, 258
and exophthalmic goiter, 148
and guanidin, 258
and hemorrhage, 258
and operation, 259
and rickets, 258
and tetany, 259
and thyroid, 25
description of, 258–259
hemophilia, 258
Parry's disease (See Exophthalmic goiter)
Partial substernal goiter, 66
Pathology of goiter, 58
Pelvic disease and simple goiter, 74
Pembertson Meadows, goiter in, 81
Pennsylvania, goiter in, 90
Personality and ductless glands, 253
Philadelphia, goiter in, 62
Phobia in goiter, 55
Physiognomy in exophthalmic goiter, 154
Pigmentation in exophthalmic goiter, 154
Pineal and age, 291
and sex, 272–273
description of, 272–273
in exophthalmic goiter, 149
treatment, 298
Pituitary and exophthalmic goiter, 148, 150
and growth, 282–283
and mind, 288–289
and sex, 262–267
Pituitary and strength, 290
and thyroid, 26, 27, 264–265
anterior, diminished function, 261–262
excessive function, 262
entire, deficient function, 265
excessive function, 266
description of, 259–267
obesity, 263
posterior, deficient function, 263
excessive function, 264–265
Pituitrin, 260, 296–297
Play and home, 249–250
and thyroid, 250
and work, 247–249
precarious, 248
vicarious, 248
Pneumonia and exophthalmic goiter, 170
Poisoning by iodine, 68, 127
by thyroid extract, 68
Poisons and thyroid, 28, 34
Potts, W. J., 109
Precocious puberty, 269
Preface, 5
Pregnancy and exophthalmic goiter, 162, 167
and goiter, 74, 77, 87, 112, 139
and metabolism, 43
and myxedema, 44
and thyroid, 32, 33, 35, 51
iodine in, 104–105, 111
Premenstrual goiter, 63 (See also Puberty goiter)
Pressure by goiter, 38, 66, 136, 161
by intrathoracic goiter, 66, 136
Prevention of cancerous goiter, 115
of cretinism, 39, 41, 111
of endemic goiter, 86, 97, 101, 110
of exophthalmic goiter, 175–182
adolescence and, 179
career in, 179
education in, 179
emotions in, 180
fashions in, 179
increasing resistance in, 178
movies in, 179
occupations in, 180
parental guidance in, 179

Prevention of exophthalmic goiter, psychic trauma in, 181
puberty and, 179
recreation in, 179
school life in, 179
shock in, 181
simple life in, 178
summary on, 182
table talk in, 178
vocation in, 180
of goiter, 77, 101–104, 110, 112, 113, 116–129
burnt sponge in, 118
butter in, 111
codliver oil in, 111
foods in, 113
hygiene in, 113
in brook trout, 97
in children, 113
in infancy, 98, 111, 112
in pregnancy, 98
iodine in, 97, 98, 107, 110, 116–129
iodized salt in, 110, 126
kelp in, 111
McCarrison's views on, 120–123
salmon in, 111
sardines in, 111
sea foods in, 111
of malignant goiter, 115
of surgical goiter, 114
of thyroid adenoma, 114
of tumor goiters, 114
versus cure, 113
treatment, iodine in, 116–129
Primary toxic goiter (See Exophthalmic goiter)
Progress in endocrinology, 5
Prophylaxis (See Prevention)
Protection of thyroid, 34
Pseudohermaphroditism, 269, 275
Psychic trauma and exophthalmic goiter, 167–174, 181
Psychotherapy, 199–202
Puberty and exophthalmic goiter, 179
and goiter, 60, 73, 76, 87, 112, 139
and sex glands, 274
Puberty and thyroid, 31, 73
precocious, 269
Pulse and cretinism, 40
and exophthalmic goiter, 151, 155
and hyperthyroidism, 48
and myxedema, 45
and thyroid, 23, 27
Punishing the thyroid, 33
Pyramidal lobe of thyroid, 19

Quack medicines, 131–133
Quacks and goiter, 55, 131–133
and intrathoracic goiter, 67
in treatment of goiter, 131–133, 142

Race and endemic goiter, 86
and exophthalmic goiter, 168
and goiter, 74, 86, 90, 95
Racial immunity in goiter, 74
Radio and thyroid, 247
in treatment, 201, 202
Rats, goiter in, 117
Read, J. M., 187
Reading in treatment, 201
Reasoning *versus* excitement, 241
Recovery from endemic goiter, 93
from exophthalmic goiter, 189, 205–208
from goiter, 93
from intrathoracic goiter, 67
Recreating forces, 250
Recreation and exophthalmic goiter, 179
and thyroid, 247
in treatment, 201, 202, 206
Reduction diet, 222–225
"treatment" and exophthalmic goiter, 179, 181
Rejuvenation, 255, 279, 298–299
Relapse in exophthalmic goiter, 160
Relatives in treatment, 200
Relaxation in treatment, 194
Relaxing forces, 250
Religion, 250
Remedies in treatment, 189
Rest in treatment, 189, 191, 193, 194, 205, 206
Rickets and parathyroids, 258

Rochester, N. Y., goiter in, 110
Rome, goiter in, 116
Ross, Mary, 109
Roth, O., 124
Rush and Jones, 80

Sajous, Charles E. de M., 8, 42, 125, 255, 261, 292
Salmon and goiter, 81, 111
Salt, iodized, in prevention, 101
Sanitarium treatment, 192
Sardines in prevention, 111
Sault Ste. Marie, goiter in, 110
Scandinavians, goiter among, 91
Schittenhelm and Weichardt, 80
School attendance and endemic goiter, 96
  life and exophthalmic goiter, 179
  teaching and thyroid, 247
Scott, L. C., 109
Sea-coast and goiter, 90
Sea foods in goiter prevention, 111
  in treatment, 106
Seashore and exophthalmic goiter, 82
Sea weed and goiter, 74
Self-drugging and thyroid, 35
  in treatment of goiter, 142
  in weight reduction, 224
Senility, 17
  and myxedema, 44
  and thyroid, 17, 29, 32, 33
Sense perception in myxedema, 45
Sex and endemic goiter, 93, 94
  and exophthalmic goiter, 167
  and goiter, 73, 93, 94
  and pineal, 272–273
  and suprarenals, 267–270
  and thymus, 271–272
  and thyroid, 31, 32, 35
  epochs, 273–275
  glands and age, 291
    and menopause, 274
    and other endocrines, 273–281
    and puberty, 274
    and strength, 290
    description, 273–281
    transplantation, 279–281
  incidence of endemic goiter, 82
    of goiter, 74, 82
Sex incidence of myxedema, 44
  in pituitary disease, 259–267
Shape of thyroid, 5, 18
Shell shock and exophthalmic goiter, 169
Sherman, H. C., 109
Shock and exophthalmic goiter, 167–174, 181
Shrinkage of thyroid, 32
Simple goiter (See Goiter)
Simple life and exophthalmic goiter, 178
Sinuses and thyroid, 35
Size of thyroid, 5, 18, 51, 52
Skin and exophthalmic goiter, 148, 150, 151, 160, 162
  and suprarenal disease, 270
  and thymus, 271
  and thyroid, 27
  disease in myxedema, 43, 45
  in cretinism, 40
  in hyperthyroidism, 48
  in hypothyroidism, 43
Sleep and cretinism, 40
  and efficiency, 235
  and emotions, 238–239
  and exophthalmic goiter, 161, 162, 169, 170, 194, 236
  and hyperthyroidism, 48, 236
  and hypothyroidism, 45
  and thyroid, 23, 35, 48, 57, 235, 236
  and toxic goiter, 57
  quantity, 236–238
Sleeplessness, 236, 238–240
  treatment of, 239
Smith, P. E. and Smith, Irene, 261
Smoking and exophthalmic goiter, 197, 198
Society and endocrines, 7, 42
  and exophthalmic goiter, 7
Soft drinks, 216
Soil and goiter, 82, 86, 118
South America, goiter in, 79
Southern States, goiter in, 90
Speech and cretinism, 40
  and exophthalmic goiter, 161
  and myxedema, 45
Speed and exophthalmic goiter, 6, 170

Speed and thyroid, 249
Spencer, Herbert, 245
Spices and goiter, 74, 141
and thyroid, 35
in diet, 216
Spleen and thyroid, 26
Sporadic goiter, 61, 69 (See also Goiter)
cause of, 119
prevention of, 112
versus endemic goiter, 61, 62, 83
Starch digestion and thyroid, 26
Stature in cretinism, 40
Status thymolymphaticus, 271
Steinach, 280
Sterility and exophthalmic goiter, 148, 162
and thyroid, 26
Stewart, C. A., 109
Stimulation of thyroid, 33, 34
St. Lawrence River, goiter about, 79
Strain of thyroid, 33, 75
Strength and ductless glands, 289–291
and pituitary, 290
and sex glands, 290
and suprarenals, 290
and thyroid, 289–291
in exophthalmic goiter, 153, 158, 159
in hyperthyroidism, 48
Stress and thyroid, 33, 75
Structural variations of thyroid, 18
Structure of endemic goiter, 83
Study and hyperthyroidism, 48
Submyxedema, 45
Subnutrition and hyperthyroidism, 48
Substernal goiter, 51, 57, 66 (See Intrathoracic and "inward" goiter)
Subthyroidism (See Cretinism, hypothyroidism, myxedema)
Sudden goiter, 75
Suprarenal cortex, diminished secretion, 269–270
increased secretion, 269
disease and blood-pressure, 270
Suprarenal disease and fatigue, 270
and skin, 270
and strength, 290
entire, diminished function, 270
medulla, diminished function, 270
increased function, 270
Suprarenals and exophthalmic goiter, 148, 150, 161
and fear, 268
and mind, 287–288
and sex, 267–270
and thyroid, 26, 46, 47
description of, 267–270
Symptoms of exophthalmic goiter, 147–164
acute, 150
adrenal, 148, 150, 161
anemia in, 160
appetite in, 158, 159
basal metabolism in, 158, 163
behavior in, 154
bewilderment in, 153
bladder in, 162
blood-vessels in, 162
cardiac, 150, 152, 155, 162
chest, 161
constipation in, 160
cough in, 161
crying in, 152
dermographia in, 160
development of, 151, 153
diabetic, 150
diarrhea in, 150, 160
digestive, 150, 159
disorientation in, 153
early, 150, 151
emaciation in, 158
emotional, 151, 152
eye, 39, 64, 151, 152, 156, 157, 165, 184
face in, 154
fatigue in, 158, 159
fever in, 150
goiter in, 155, 156, 184
hair in, 161
heart in, 150, 152, 155, 162
hoarseness in, 161
insomnia in, 161, 162

Symptoms of exophthalmic goiter,
intestines in, 160
itching in, 161
kidney, 149
laughing in, 152
liver in, 149
lungs in, 161
melancholy in, 153
menstrual, 162
mental, 65, 149, 150–154, 162, 194–202
moods in, 152, 153
myxedema in, 164
nausea in, 150, 159, 161
neck, 152, 153, 155, 156
nervous, 150, 153
neuritis in, 162
ovarian, 148
palpitation in, 152
pancreatic, 148
parasympatheticotonic, 149
parathyroid, 148
physiognomy in, 154
pigmentation in, 160
pineal, 149
pituitary, 148, 150
pressure, 161
pulse in, 151, 155
relapse in, 160
skin in, 150, 151, 160, 162
sleep in, 161, 162
speech in, 161
sterility in, 162
strength in, 153, 158, 159
suprarenal, 148, 150, 161
sweating in, 150, 160
sympatheticotonic, 149
talking in, 154
temperature in, 161, 163
thinking in, 154
thyroid, 150, 151, 155, 156
trembling in, 152, 155
tuberculosis in, 161
vagotonic, 149
vicious circles in, 198
voice in, 161
volition in, 153
vomiting in, 150, 159
walking in, 154
Symptoms of exophthalmic goiter,
weakness in, 158, 159, 161
weight in, 151, 157, 161

Talking in exophthalmic goiter, 154
Tea and goiter, 141
and thyroid, 35, 216
Teeth and exophthalmic goiter, 170
and goiter, 70, 112
and hyperthyroidism, 48
and thyroid, 33, 35
in treatment, 181, 199
Teething and cretinism, 40
and thyroid, 23, 25
Temperature in cretinism, 40
in endemic goiter, 86
in exophthalmic goiter, 161, 163, 168
in myxedema, 45
Tetany and parathyroids, 259
Tethelin, 260
Thinking and anger, 241
and fear, 241
and health, 241
and thyroid, 241
and worry, 241
in exophthalmic goiter, 6, 154
Threshold of emotional reaction, 180, 242
Thrills and exophthalmic goiter, 249
Thymus and age, 291
and asthma, 272
and crime, 271
and exophthalmic goiter, 148
and sex, 271–272
and skin, 271
and thyroid, 26
and X-ray, 272
description of, 271
persistent, 271–272
Thyroid a body protector, 28
absence, 39
accessory (See Aberrant)
active principle of, 20, 21
adenoma (See Adenoma)
a disease fighter, 28
anatomy of, 18
and adolescence, 31, 33
and adult life, 32

Thyroid and age, 32, 47, 291
and alcohol, 35, 216
and amusements, 247
and appetite, 23, 26
and blood, 27, 34
and blood-pressure, 27
and blood-vessels, 17
and body temperature, 25, 50
and bowels, 26, 34, 35
and childhood, 31
and circulation, 17, 27
and coffee, 35
and condiments, 35
and cretinism, 37, 38
and crime, 41
and development, 29, 31
and diabetes, 26
and diet, 35, 213–234
and digestion, 35
and disease, 35
and eating, 213–234
and epilepsy, 42
and emergencies, 32
and emotions, 35, 241–245
and endocrinology, 25
and eugenics, 42
and exertion, 18
and exophthalmic goiter, 28, 30, 147, 148, 150, 151, 155, 156, 165
and fatigue, 35
and fever, 25
and flesh foods, 213–215
and glandular equilibrium, 25
and goiter "cures," 35
and goiter regions, 36
and gonads, 31
and growth, 18, 23, 29, 31, 39, 40, 41, 42, 43, 282
and health, 30
and heart rate, 27
and hyperthyroidism, 30
and hypothyroidism, 30
and immunity, 34
and infancy, 31
and infections, 18, 28, 33, 34, 35, 44, 52
and influenza, 35
and insanity, 7
and intestines, 33
Thyroid and irritants, 33
and kidneys, 23, 26, 34
and lactation, 51
and laughter, 250
and life, 21, 31
and liquor, 249
and liver, 34
and meats, 35, 213–215
and menopause, 32, 33, 52
and menstruation, 18, 26, 32, 35, 51
and metabolism, 17, 22, 50
and mind, 17, 23, 31, 285–289
and music, 250
and nasal passages, 35
and nausea, 26
and nursing, 51
and obesity "cures," 35
and offspring, 35
and other ductless glands, 17
and ovaries, 26
and pancreas, 26
and parathyroids, 25
and pituitary, 26, 27, 264–265
and play, 250
and poisons, 28, 34
and pregnancy, 22, 33, 35, 51
and puberty, 31, 73
and pulse, 23, 27
and radio, 247
and recreation, 247
and school teaching, 247
and self-drugging, 35
and senility, 17, 29, 32, 33
and sexual development, 26, 31 32
and sinuses, 35
and skin, 27
and sleep, 23, 35, 235
and speed, 249
and spleen, 26
and starch digestion, 26
and sterility, 26
and stimulants, 32
and strain, 33, 75
and strength, 289–291
and stress, 33, 75
and suprarenals, 26
and tea, 35, 216
and teeth, 33, 35

Thyroid and temperature, 23
and the female, 32
and the Japanese, 22
and the liar, 41
and the mind, 28
and thinking, 241
and thymus, 26
and tonsils, 18, 33, 35
and toxic goiter, 58, 64
and undernourishment, 30
and unhygienic conditions, 33
and vegetarianism, 215
and vocation, 247
and weight, 23
and worry, 35
an immunizer, 28
as a catalyst, 22
atrophy of, 18, 32
blood supply of, 20
"burned out," 44
cancer of, 38, 39, 59
colloid in, 20
conservation of, 46
cysts, 58, 115, 135
deficiency, 43
(See also Cretinism, hypothyroidism, myxedema)
degeneration, 34
depression *versus* stimulation, 34
description, 257–258
dysfunction, 49
excessive function, 47 (See also Hyperthyroidism)
extract and cretinism, 41
and exophthalmic goiter, 171
poisoning, 68
treatment, 111, 292–293
function, 20, 30, 37, 38, 39, 48
versus structure, 30, 37, 38, 39, 48
hormone, 20, 21
in disease, 37
inflammation, 76
influence over life, 36
injury to, 33
in treatment of cretinism, 111
iodine content of, 21, 22, 119
iodine variations in, 22
irritation of, 34
life's barometer, 36
Thyroid, location of, 18
measurement of, 52
operations on, 28, 52
protection, 34
pyramidal lobe of, 19
shape of, 5, 18
shrinkage, 32
size of, 5, 18, 51, 52
stimulation *versus* depression, 34
structure *versus* function, 30, 37, 38, 39, 48
surgery of, 46, 47
surveys, 85–107
treatment in pregnancy, 111
value of, 29
variations in function, 25, 26
in structure, 18
weight of, 5
what is it?, 17
Thyrotoxicosis (See Hyperthyroidism, toxic adenoma)
Thyroxin, 21
in cretinism, 41
Tobacco and exophthalmic goiter, 197, 198
habit, 48, 197, 198, 246
Tobler, T., 124
Tongue, goiter of, 68
in cretinism, 40
Tonsils and goiter, 70, 71, 96, 112, 170, 171
and hyperthyroidism, 27, 48
and thyroid, 18, 33, 35
in treatment, 181, 199
Toxic adenoma, 34, 38, 47, 48, 57, 62, 135, 136
(See also Hyperthyroidism)
and heredity, 65
and infections, 48
and mind, 65
and pulse, 48
and thyroid, 58, 64
and trembling, 57, 64
blood-pressure in, 65
course of, 62–64
eyes in, 64
insomnia in, 57
treatment of, 65, 135, 136
versus exophthalmic goiter, 64, 65

Toxic goiter (See Hyperthyroidism, toxic adenoma)
and metabolism, 58, 64
and nervousness, 57, 64
and weight, 58, 64
heart in, 57
neck in, 58
palpitation in, 57
sleep in, 57
sweating in, 57
symptoms, 48
weakness in, 58
Toxicity from iodine, 61, 68, 123–129
in endemic goiter, 83
in intrathoracic goiter, 67
Trachea, aberrant goiter of, 68
Tranquility in treatment, 191, 194, 200
Treatment and weight, 141
diet in, 217–219
discrimination in, 134
fish in, 106
foods in, 105–106
iodine, 22, 55, 61, 111, 116–129
milk in, 106
of adenoma, 115
of cretinism, 39, 41
of cystic goiter, 115
of diabetes mellitus, 299–300
of exophthalmic goiter, 128, 183–209
appendix in, 199
bathing in, 195
controversy over, 185
cooperation in, 190
course under, 202–206
diet in, 196, 205
diplomacy in, 200
duration of, 202–206
early, 190
endocrinologist in, 189
exercise in, 194, 195, 206
forced feeding in, 196
friends in, 200
games in, 202
goiter in, 183, 206, 207
hibernation in, 193
home in, 191
hospital in, 192
Treatment of exophthalmic goiter,
ice bag in, 196
in country, 192
individualization in, 189
infections in, 181
in mountains, 192
in sanitarium, 192
iodine in, 128–129
massage in, 195
medical, 186, 189, 198
mental adjustment in, 194, 199–202
music in, 202
nervous system in, 199
non-operative, 186, 189, 198
operations in, 183–187, 199
operative mortality in, 195
patience in, 186, 204, 205
progress in, 195, 202–206
psychotherapy in, 194, 199–202
radio in, 201, 202
reading in, 201
recovery under, 205–208
recreation in, 201, 202, 206
relatives in, 200
relaxation in, 194
remedies in, 189
rest in, 189, 191–194, 205, 206
sleep in, 194
smoking in, 197, 198
social atmosphere in, 192
surgery in, 183–187, 199
teeth in, 181, 199
tobacco and, 197, 198
tonsils in, 181, 189
tranquility in, 191, 194, 200
views of other observers on, 187–188
visitors in, 200
walking in, 194
water in, 195
weight in, 196, 197
work during, 190, 191
of goiter, 131, 143
discrimination in, 134
fads in, 133
hygiene in, 141
medicinal, 142

Treatment of goiter, quacks in, 131–133, 142
self-drugging in, 142
of hemophilia, 299
of hypothyroidism, 41
of intrathoracic goiter, 136
of non-surgical goiter, 139–143
of toxic adenoma, 135, 136
sea foods in, 105–106
vegetables in, 106
Trembling and exophthalmic goiter, 148, 152, 155
and goiter, 64
and toxic goiter, 57
Tressler and Wells, 109
Tuberculosis and exophthalmic goiter, 161, 169, 170
Tumor goiters, 58, 59 (See also Toxic adenoma)
Tumor of pelvis and simple goiter, 74
Turrentine, J. W., 109, 111
Types of exophthalmic goiter, 150
of goiter, 57

Undernutrition and goiter, 56, 74, 139, 140
and thyroid, 30
United States, goiter in, 83, 85–107
goiter zones in, 83, 85–107
Public Health Service and goiter, 85–107
Utah, goiter in, 90
Utrecht, goiter in, 117

Vagotonia, 149
Value of thyroid, 29
Variations of thyroid, 18, 25, 26
Varicose veins in myxedema, 45
Varieties of exophthalmic goiter, 150
of goiter, 57
Vegetarian diet, 106, 215
Vegetarianism and thyroid, 215
Veissmann, A., 124
Vicious circles in exophthalmic goiter, 198
Virginia, goiter in, 89
Virilism, 269
Visitors in treatment, 200
Vocation and exophthalmic goiter, 180
and thyroid, 247
Voice in exophthalmic goiter, 161
Volition in exophthalmic goiter, 153
Vomiting and exophthalmic goiter, 150, 159
and thyroid, 26
Von Fellenberg, T., 118
Von Müller, F., 214
Voronoff, 280

Walking in cretinism, 40
in exophthalmic goiter, 154
War and exophthalmic goiter, 7, 168
and goiter, 89, 116
Washington State, goiter in, 90
Water and goiter, 83, 84, 88, 116, 117
in treatment of exophthalmic goiter, 195
Weakness in exophthalmic goiter, 158–161
in toxic goiter, 58
Weather and endemic goiter, 86
Wegelin, C., 6, 80, 117, 124
Weight and diet, 233, 234
and exophthalmic goiter, 141, 151, 157, 161, 196, 197, 233–234
and hyperthyroidism, 48
and myxedema, 45
and reduction fad, 226–228
and self-drugging, 224
and thyroid, 23
and toxic goiter, 58, 64
and treatment, 141
desirable, 223
how to increase, 226–233
how to reduce, 223–225
loss and exophthalmic goiter, 157
of thyroid, 5
Weininger, O., 276
Weisel, J., 124
West, goiter in, 79
West Virginia, goiter in, 89

What is the thyroid? 17
Wheatley, J., 109
Williams, E. H., 266
Wisconsin, goiter in, 90
Wise, Stephen S., 237
Work and exophthalmic goiter, 169, 180
and play, 247–249
and worry, 246
during treatment, 190, 191
Worry and exophthalmic goiter, 152, 169, 172, 174
Worry and health, 243–245
and hyperthyroidism, 48
and thinking, 241
and thyroid, 35
and work, 246
Wounds and myxedema, 45
Wyoming, goiter in, 90

X-ray and thymus, 272
in intrathoracic goiter, 53, 67

APR 13 1989
NOV 2 1989
APR 20 1992
OCT 26 1993
OCT 19 1994
MAR 11 1997
APR 14 2000
APR 15 2002
MAR - 8 2007

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